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REPORT OF THE
TWENTY-SIXTH ROCKY MOUNTAIN CONFERENCE
OF ENTOMOLOGISTS

CAMERON PASS CAMP
COLORADO

August 9-13, 1955

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Report of the Twenty-Sixth Rocky Mountain Conference of Entomologists, Cameron Pass Camp, Colorado, August 9-13, 1955.

The Place of Meeting: Cameron Pass Camp is an old C.C.C. camp located in the State Forests about 85 miles west of Fort Collins, Colorado at an altitude of about 9500 feet. It is currently being used as a 4-H Club camp by northern Colorado counties. Visitors are housed in bunk houses and cabins and meals are served at a central dining hall.

Date of Meetings: August 9-13, 1955.

Officers of the Conference for 1955: Phil Ray, Chairman; Claine Titensor, Vice Chairman; J. L. Hoerner, Treasurer; T. O. Thatcher, Assistant Treasurer; George M. List, Secretary; Gordon T. Mickle, Assistant Secretary.

The Meetings: The entire day of August 11th was given for recreation, which included insect collection, field trips, mountain climbing, fishing, small group picnics, horseshoes, miniature golf, and just resting. The evening meetings were given largely to the less technical subjects of general interest to the entomologists and members of their families. Square dancing and group singing usually closed the evening sessions. The teen agers and kiddies took over for the evening of August 11th and gave their usual fine, impromptu program.

Attendance by States: One hundred fifty-five were in attendance. Seventy-one of these were entomologists, the remainder were members of families.

Registration Records:

California

Dean, D. W., San Francisco
Denning, D. G., Walnut Creek
Denning, James, Walnut Creek
Denning, Loretta, Walnut Creek
Steinen, Otto, Los Angeles
Thrailkill, R. B., Oakland

Colorado

Anderson, Joan, Palisade
Anderson, Lorin, Palisade
Cherry, Mrs. Polly, Denver
Cherry, W. F., Denver
Daniels, Anne M., Ft. Collins
Daniels. Leslie B., Ft. Collins
Elmblade, Janey, Greeley
Finlay, Mildred P., Estes Park
Finlay, Wm. J., Estes Park
Foeppel, Mayes, Greeley
Foeppel, Bill, Greeley
Hoerner, Edna B., Ft. Collins
Hoerner, John L., Ft. Collins
Jenkins, Leonard E., Ft. Collins
Johnson, E. R., Denver
Knight, Fred B., Ft. Collins
Knight, James W., Ft. Collins
Knight, Jane W., Ft. Collins
Knight, Mary Jane, Ft. Collins
Knight, Susan Linda, Ft. Collins
List, Geo. M., Ft. Collins
McCrory, Mrs. C. B., Denver
McCrory, Charles Bryce, Jr., Denver
McCrory, Pamela, Denver
McCrory, Sharon, Denver
McLaughlin, Eleanor, Deer Trail
Maksymivk, Bohdan, Ft. Collins
Mickle, Gordon, Ft. Collins
Moffett, Joseph O., Ft. Collins
Nagel, Roy H., Ft. Collins
Newton, J. H., Paonia, Colo.
Palmer, Miriam A., Ft. Collins
Pankaskie, Joe E., Denver
Powers, Pat, Denver
Priola, M.A., Denver
Quist, John A., Ft. Collins
Randall, Frank J., Grand Junction
Ray, P. A., Denver
Rodeck, Helen E., Boulder
Rodeck, Hugo G., Boulder
Schornack, Allen, Denver

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Colorado (con't)

Shriver, Ron, Grand Junction
Simpson, Robert G., Denver
Simpson, Diane, Denver
Simpson, Annabelle, Denver
Sooter, Clare Ann, Greeley
Sooter, Clarence A., Greeley
Sooter, E. Grace, Greeley
Sooter, Leslie, Greeley
Thatcher, T. O., Ft. Collins
Titensor, Claine E., Eaton
Wilford, Bill H., Ft. Collins
Wilford, Tim, Ft. Collins
Wilson, Wm. T., Ft. Collins
Wygant, Dale I., Ft. Collins
Wygant, Noel D., Ft. Collins

Illinois

Allmon, Ross H., Chicago

Kansas

Bryson, Bill, Manhattan
Bryson, H. R., Manhattan
Bryson, Mrs. H. R., Manhattan
Bryson, Kathleen, Manhattan
Burkhardt, Barbara, Manhattan
Burkhardt, Chris C., Manhattan
Burkhardt, Dorothy A., Manhattan
Burkhardt, Paul, Manhattan
DePew, Helen, Garden City
DePew, Les, Garden City
DePew, Lois, Garden City
DePew, Neil, Garden City
Gates, D. E., Manhattan
Gates, Kathryn, Manhattan
Knutson, Helen, Manhattan
Kutson, Herbert, Manhattan
McColloch, Mrs. J. W., Manhattan
Marvin, Frances, Manhattan
Marvin, Linda Sue, Manhattan
Marvin, Loretta, Manhattan
Marvin, Philip H., Manhattan
Marvin, Phillip, Jr., Manhattan
Matthew, Ann, Manhattan
Matthew, Dave, Manhattan
Matthew, Davey, Manhattan
Matthew, Ven, Manhattan
Melburn, Jack E., Wichita
Moore, James, Wichita
Nonomaker, Dorothy, Manhattan
Nonomaker, Mrs. H., Manhattan
Painter, Beth, Manhattan
Painter, Reginald H., Manhattan
Parker, R. L., Manhattan
Parker, Mrs. R. L., Manhattan
Somsen, Harry W., Manhattan
Somsen, Marilyn, Manhattan
Somsen, Marjorie, Manhattan

Massachusetts

Alexander, Charles P., Amherst
Alexander, Mabel M., Amherst

Mexico

Garcia, Ramon, Saltillo Coachnila

Minnesota

Iverson, Leo,

Missouri

Buchanan, W.D., Columbia

Nebraska

Alexander, Eugene, Lincoln
Alexander, Gertrude, Lincoln
Alexander, Harold, Lincoln
Fuxa, Betty Jane, Omaha
Fuxa, Raymond J., Omaha
Fuxa, Roland, Omaha
Fuxa, Shirley Lou, Omaha
Lanyon, Lillian, Omaha
Walstrom, Cliff, Lincoln
Walstrom, Doug, Lincoln
Walstrom, Flo, Lincoln

New Mexico

Dobson, Bobby, State College
Dobson, Dorothy, State College
Dobson, Jim, State College
Dobson, R. C., State College
Dobson, Tom, State College

New York

Back, Richard C., Irvington

Ohio

DeLong, D. M., Columbus
Edse, Frances, Columbus
Edse, Peter, Columbus
Edse, Rudolph, Columbus
Parks, T. H., Columbus
Parks, Mrs. T. H., Columbus
Venard, Carl, Columbus

Oklahoma

Howell, D. E., Stillwater
Howell, Mrs. D. E., Stillwater
Howell, Kay, Stillwater
Howell, Susan, Stillwater
Howell, Tom, Stillwater

South Dakota

Hixson, Ephriam, Brookings, S. D.
Hixson, Ephriam, Jr., Brookings
Hixson, Veallon, Brookings

Utah

Knowlton, George F., Logan
Knowlton, Mary W., Logan
Reeves, Geo. I., Salt Lake City
Reeves, Mrs. Geo. I., Salt Lake City

Virginia

Davis, Louis G., Vienna

Washington

James, Helen B., Pullman
James, Maurice T., Pullman

Wyoming

DeFoilart, David, Laramie
DeFoliart, G. R., Laramie
DeFoliart, Louise B., Laramie
DeFoliart, Sharon, Laramie
Freytag, Paul, Laramie
Fronk, Carol, Laramie
Fronk, Erick, Laramie
Fronk, W. D., Laramie
Fronk, Mrs. W. D., Laramie
Pfadt, R. E., Laramie
Robb, T. R., Laramie

Partial Report of the More Technical Sessions:

Chairman Phil Ray appointed the following program committee: Ephriam Hixson, Chairman; T. H. Parks, D. E. Howell, Herbert Knutson and George M. List. This committee arranged the subjects that had been sent in for discussion into related groups and selected leaders and chairmen for the various technical sessions. Tape recordings were made of the principal parts of these programs. This report has been made largely by briefing these recordings. No attempt was made to record the entomological portions of the evening meetings, as this consisted largely of pictures and matters of less technical nature.

Opening Session: Mr. Phil Ray, Conference Chairman, opened the meeting with a few remarks and introduced Lou Davis, the chairman for this session, on Field Crop Insects.

Lou Davis: I certainly appreciate this opportunity of starting this program this morning. I've had an opportunity over the years to attend a good many Rocky Mountain Conference meetings. This Conference has constantly gained in statue and is well recognized throughout the country. We have four assigned topics for discussion this morning. We'll be glad to welcome other topics from the floor if we have time. The first topic for discussion this morning is the Yellow Clover Aphid. This aphid has come in for quite a bit of consideration in the last 2 or 3 years, particularly the last 2 years. I think it was in 1953 that it showed up in New Mexico and shortly thereafter, in California and since that time it has been picked up in a number of western states. The species was first described in Washington in 1884. It has caused a lot of economic damage in recent years. There is some question in the minds of many workers as to whether or not it is the same species, or whether it may be a sub-species or variety. The Entomology Research Branch through their laboratory in Anaheim, California, in charge of Wayne Howe, has been doing a lot of work on host plants. I'd like to call on Dr. Dobson from New Mexico.

R. C. Dobson: The Yellow Clover Apid. I don't believe that the insect we have in New Mexico is the same as the one described in Washington. I'm sticking my neck out on that, but we can't find it on yellow clover, in New Mexico. We get the winged ones drifting through yellow clover but I have never found a nymph or wingless adult on yellow clover. It's rather peculiar because in our alfalfa fields, they are all irrigated, of course, we have borders between sections of the alfalfa and frequently we get wild yellow stands on the border. The alfalfa on either side of the yellow clover strip will be completely killed out by yellow clover aphid and yet there are no nymphal yellow clover aphids on the yellow clover. We find them on burr clover and on Black Medic. They do very well on both. They killed out the Black Medic on the lawn at New Mexico A and M. To go back a little on the amount of injury that we have sustained in New Mexico. Our figures last year look rather surprising against Arizona and California. We figured we had four million dollars worth of damage not counting reseeding costs and re-establishment of stands. That's just production losses. Actually, Arizona and California are down in the hundred thousand dollar level. They never did hit the million dollar mark. Dr. J. R. Eyer and I figured the New Mexico loss as ten million dollars. So we, being true scientists, cut it in half. Then we decided that five million dollars was too round a figure so we cut it another million dollars. I think Arizona and California now realize that there was a tremendous amount of damage that they didn't record. We thought during winter that the yellow clover aphid would leave us. But it stayed right on the plants and any time from November through February we could go out and collect between 15,000 and 20,000 in 20 sweeps. Along about February the weather got cold for us. It didn't get much below freezing, but it never warmed up in the daytime to 70°. It stayed down around 45° and 50° for about two weeks. The aphid didn't seem to disappear. We were all set to go with a big spray program. We had a tremendous population of ladybird beetles, actively working in yellow clover aphid fields. They weren't controlling the aphids but they were building up some tremendous numbers. In February when cold weather came along the ladybirds dispersed and the aphids came back. Our first cutting of hay was just a little better than non-existent Some of the farmers did cut some hay. New seedings were eliminated. In fact, I don't think there was 10% stand in the Cienega and Pecos valleys this spring on first seeding. Some farmers seeded four times. The older hay which had been in just a year before came back. Instead of 5 or 10 sprouts per crown, we got 1 or 2. It's very fine textured hay. You don't make poundage on 1 or 2 sprouts per crown. Fortunately, we had done quite a bit of work on chemical controls and we had some materials which would work. In the Pecos Valley they had a much more serious condition than they did in the Rio Grande, and it took about three sprayings to get the first crop. In the Rio Grande Valley we were getting the first crop off with two sprayings. The second crop everybody sprayed and we got about two-thirds crop. Right after the second crop was taken off the ladybird beetles showed up again and in some fields they did a very good job of controlling the aphids. In other fields we went back to spraying. Immediately after cutting and baling of the second cutting, they take it off as soon as possible. When the alfalfa is 4" high they go across it with a sprayer. There will hold for about two weeks. Then the hay is pretty well made. Before the aphids get to a really heavy population again they get the hay off. After the third cutting we start getting rain in the Rio Grande and Pecos Valley. Matter of fact, we got more rain in July this year than we had all last year. We got 3-1/2 inches. The aphids seemed to have dropped off a little. We had some high humidity periods -- between 40 and 50%. Just before I came here it cleared up and they are coming back. Aphids don't like our cool weather. Cool in New Mexico in July is about 85 and 95°. With relatively high humidity we lost our population. It warmed up and dried off just before I left and they are coming back. We have two strains of alfalfa that we are trying now on the college farm that has shown some excellent tolerance -- New Lahaton and African. The African is not resistant. It has a very fast recovery rate and grows very rapidly under hot temperatures and outgrows the aphids. It's the only alfalfa I've ever seen that did. With Lahanton the populations just don't build up. We've got some trial plots on the college farm, 50 ft. rows, replicated eight times and the New Mexico Common after three weeks when it should be up 10 to 12 inches is only 3 or 4 inches high, while the African is about 8 to 10 inches high. The population on the New Mexico Common in the adjacent rows is tremendous. The African will have a high population but it grows anyway. I don't know why. It's a big leafed, coarse alfalfa. It's not too well thought of but it will grow under aphid infestation. We have some New Mexico synthetics that we think will prove out fairly well. Within two years we should have one that can at least live with the yellow clover aphid. There are probably 10,000 acres of corn in the Rio Grande Valley this year. The farmers were afraid to put their fields back into alfalfa. The Pecos Valley was gone to Sudan and other grass mixtures. In fact, there is one sheep raiser who had 900 acres of alfalfa under irrigation who now has 900 acres of Sudan grass. He lost his entire stand of alfalfa.

In spraying we are using malathion, parathion, methyl parathion. Those are the three recommended materials. Experimentally, we are getting good results from Chlorothion -- one of Shell's materials, and two or three others. They haven't been cleared but we are sending residue samples to the Shell Company. We are not recommending systox in New Mexico. We are not recommending it even for seed anymore. We did at one time because we were forced into it. We were almost forced into putting systox on forage alfalfa, but we will not do it. It's not registered for labeling in the state and it will not be. California did register it. However, California has a system of regulation in their country which we could not approach. As I understand it, in order to use systox on forage alfalfa in California, it is necessary to get a permit from the county commissioner. It is necessary to have a registered applicator do it. The amount of material to be used is doled out. They get an allotment for the number of acres they have. They are told when to put it on and when to cut. They can't cut it before 21 days. We tried that in New Mexico. They put systox on three days before they cut. We don't have the laws or manpower to police a thing like that. Since we do get fairly good control from the materials I mentioned, those are the ones we will use.

They say the aphid does not do too well in high altitudes or in cold climates, but we've got infestations up 35 miles north of Espanola at 6500 feet and it gets pretty cold up there.

Burkhardt: Where you get by with one application, when is it put on?

Dobson: When the alfalfa is 4 inches high.

Marvin: What are those rates of malathion, parathion and methyl parathion?

Dobson: Parathion and methyl parathion, 4 to 6; 50% malathion, 1-1/2 pints to 2 pints to the acre

Question: What is the yellow clover you speak of?

Dobson: It's the yellow sweet clover.

DePew: Have you used lindane against the clover aphis?

Dobson: We've used it but it was not very satisfactory. We've had some rather pointed letters from Federal Food and Drug people regarding the use of benzene hexachloride on alfalfa.

Question: You mentioned when you started your discussion that you did not think it was the yellow clover aphid, if not, what is it?

Answer: The California people call it the spotted alfalfa aphid. I don't think this is the same as the original yellow clover aphid.

Question: On your recommendations of applications, was that ground equipment or air?

Answer: Ground equipment.

Question: What about the gallonage?

Answer: It's around 7 to 12 gallons to the acre.

Lou Davis: I think perhaps we'd better move along and get a few points on this insect from some of the other states. Original collections were east of the Mississippi. It now reaches all the way from Louisiana to Utah and embraces most of the western states. Nebraska and Kansas got into the act most recently. I would like to have Dr. Howell give us a little slant on the Oklahoma situation.

Dr. Howell: Through a fortunate chance we were able to follow the yellow clover aphid as it appeared at least around the college at Stillwater. We made a rather intensive survey of alfalfa pests and in the middle of July of last year we noticed this new pest. They showed up in relatively small numbers until about September, then it increased with phenomenal rapidity and it reached -- we were using sweeps then -- counts up to 4,000 for 15 sweeps. Then the weather became cold, the alfalfa became inactive and the clover aphid went down to a relatively low ebb until around January when a new flush of alfalfa came up and the rate went up very rapidly. About the same time in the southern part of the state we started getting reports of green bug on alfalfa. Obviously, it was not green bug. It was this pest that was new to the state. Then by February it was a serious pest over the central portion, mostly south central, but it rather quickly moved up into central and then hit the north central portion of the state. We soon became uncertain of our readings when we used sweep nets. In other words, does it mean much when you sweep alfalfa that is 8 inches high or you sweep alfalfa that is 3 inches high? So we switched to the Henderson fork method developed for brown wheat mite. I think most of you are familiar with it. It is a very nice gadget for this sort of thing. It's a little fork that has a lot of little clips that hold glass plates, that have an adhesive mixture on them. You slip this under the alfalfa. You strike the alfalfa in the same manner, five times in our particular procedure. These glass plates can be read as much as ten days later. You can put them in the ice box. We have little square boxes so you can carry them around. One box will allow you to sample up to 120 places in the field. Our readings from then on have been based on that number. We were curious to know how good that method was so we compared it with sweeps and the California terminal method. We are getting much higher populations with the sampler than with sweeping or the terminal. So I think it is apparent that we are missing a lot when we use the sweep method along. About the first of March heavy populations developed in our breeding nurseries and in our commercial plantings. We were able to set up very nicely replicated experiments. Just as all the other states, we tested practically all the materials that were available. Interestingly enough, the one material that looked best is still just a number, Carbide and Carbon 8305. It hasn't been cleared and isn't ready for use but it does show considerable promise. We ran through the Hercules Powder material you mentioned. The American Cyanimid's new systemics were approximately equal with systox but systox, interestingly enough, was no better for us than parathion or methyl parathion. Unlike some of the others, methyl parathion was not quite equal with parathion. We are not quite so lucky as to be able to control our growers well enough to say you cannot put it on by air. I suppose we have records of about 125,000 acres being treated by air. The main materials used were parathion, methyl parathion. But methyl parathion rather rapidly lost favor toward the end with commercial applicators. For ground equipment we used malathion at 8 oz. per acre. If it is going on by air, any of the three -- malathion at 8 oz.; parathion at 4-6 oz., unless the alfalfa is very high; methyl parathion at 8 oz. We have an intensive alfalfa breeding nursery. Nothing has shown up a good, consistent record. Fortunately, our breeding nurseries are planted in rows of twelve replications. What looks wonderful one time isn't worth anything the next time. The Turkish, Syrian, Russian and Indian strains are not holding up. We sample them weekly. One week they may look good. Next week they might have a high population. So at the present time the alfalfa breeder has no good lead as far as resistance goes.

As to our impression as to whether it is the old trifolii or the new maculatus, I think we would go along with New Mexico and say that it seems to us to be a different insect. I'm not saying it's a species or sub-species. There are several reasons for this conclusion. Just as was mentioned earlier, the clovers may be separated by 12 inches from the alfalfa in regular breeding nursery rows and they have another aphid that isn't quite the same. The aphid on the clover is not quite as active. It doesn't tend to feed on you when it's hot and that's one of the things our samplers dislike about this very numerous aphid that just came in. Don't ask me why aphids bite. The workers are very insistent that it bites and bites hard. The one on the clovers doesn't do it. Now another thing that is quite apparent is that there are many winged forms on the maculatus and relatively few winged forms on the other. Apparently the winged forms get up and leave because you will see a little cluster of immatures and maybe you will find a single winged aphid on that leaf. But on the other you will find large numbers of winged forms. So it seems to me there is probably a real difference. As to the damage I think we go along with New Mexico. Our Agronomy people made samples after the season was pretty well along. They have made the statement that 40% of all alfalfa plants in Oklahoma were killed. That isn't quite fair. We had a drouth period. Alfalfa in most cases is not irrigated and we had severe cold weather. We had as high as 2,000 aphids for a 2-1/2 inch unit. Now you can convert that per acre, if you want. Anyway, there was a very tremendous population. After the alfalfa was up we got 8° weather. The aphid population had not changed. So I think you can pretty well say that normal weather conditions in growing alfalfa are not going to influence it. Now what has happened during the summer? We followed that. The first of May it started going downhill very abruptly and continued that way for about three weeks. Then it started going up rapidly. In the middle of July it was going down again. Our humidities were in the 70's and sometimes in the 80's because we have had fairly decent weather. I believe only two days were above 100°.

The predator populations, as far as we know, consists only of ladybirds. We have never found any decent populations of neuroptera or syrphidae. We have never found a parasite. A week ago (mid-August) Dr. Bartlet from Riverside was through. He was pointing out that they had found quite a number of individuals of a single parasite on the eastern strain. Lysiphlebus may be in the same field working on the pea aphid, but it does not touch this one.

We have sprayed some fields as high as twelve times but lost them. The farmers are somewhat discouraged. The thing that worries us is what in the world do you tell a man to do when he has a lot of ladybird beetles in the field or when the wind is coming from another field that's heavily populated? The whole thing to us is pretty much of a mystery yet. We don't have the answers. Sorry to say, we don't even have a spray schedule worked out. We have sprayed some fields four times and never got it cut. We've sprayed other fields one time and did get it cut.

Chairman: We do have a very interesting subject and we do want to give it all the time that we possibly can. If you will therefore confine your questions until the end. Dr. Knowlton, will you take about five minutes and give us a little slant on the Utah situation.

G. F. Knowlton: We in Utah have been quite concerned about this aphid since it swept across the states adjacent to us on the south and this spring in particular I tried to keep the county agents in the southern counties alert in watching for this. In one of our southwestern counties we had a call on what to do about pea aphid and they sprayed but, when we went over to see it later, it turned out to be this species. From early May until May 24th we found it in every place in Washington County and getting into one corner of Iron County to the north of that. At that time we could find none in King County and other southern counties adjacent to it, but I did pick up one specimen in Fredonia, Arizona across the line. By June 22nd it was taken on every sweep of alfalfa any place as far north as north of Glendale, being so common in some places as to be causing some injury. It increased its range in Iron County by that time. By June 24th this had moved up to Beaver and Miller Counties, Miller County being our most important alfalfa seed-growing area, but it was in small numbers except in just one field. The aphids had built up more rapidly than we had expected. It has been very erratic in its effect as to outbreaks. We have hesitated to recommend control as so many of our fields have a heavy population of ladybird beetles, damsel bugs, aphid lions, and sometimes quite a few of the syrphid flies, although we are not sure that they attack this species as much as the pea aphid. Where control has been necessary and there has been quite a little of it, usually parathion, 1 pint of 25% emulsifiable material is used. There has been considerable variation with regard to airplane application. Although in the last two weeks I was told by an applicator at Cedar City, he treated 5300 acres in Iron and Washington Counties generally with the 2 pints, using 3 gallons of water, while another plane was using a little less than 2 gallons of water. They said they were getting control. In some areas they used this same application but had not received much of any benefit from it. It's also getting to be very serious in Miller County-- our important seed growing area -- where the county agent said they tried about everything and the best results were by ground equipment where they are using from 1 to 1-1/2 pints 25% parathion to the acre. The best control they got of any was in a field where they used ground equipment with the pressure 60# at the end of the boom. One of our problems in regard to control is that we seem to have such a lot of flying aphids all the time. In Miller County the man that put it on told the agent that he had to keep a handkerchief on the seat and keep brushing these flying aphids off his goggles. The flyer at Cedar City told me that one of his problems was that they had to thoroughly clean off the front of the wings every 2 or 3 days or they would have so much wind resistance that it was difficult to handle the plane. I'm just surprised that they don't spread even more rapidly. They have moved to the western side of Utah now. Just as we were leaving on our way to come to these meetings and checking through Box Elder County, we checked them up there. Early in the week I also picked it up in Wayne County. So there are quite a lot of counties that are infested now. We've tried to follow it rather carefully.

Chairman: We'll drop over to Kansas then and get a picture from Dr. Knutson.

Herbert Knutson: We've had only this year to work on this. The first records were picked up in south-central Kansas and the first economic damage was reported early in June. We had a cold, wet June and just about when we were ready to do some extensive spray studies, populations suddenly decreased and you could find plants that were black at the bottom and stunted with no aphids present. One man from the U.S.D.A. made a survey east and west through the state. He ended up with twelve specimens. Then reports of economic damage began to come in during the last two weeks. The first field, near Marion, was checked on by Burkhardt. The ladybird population was so great that he decided it was best to hold off spraying. We are interestingly situated here (Kansas) from an academic standpoint, since we are in the overlap between where the species on the alfalfa has moved up in one season plus an endemic situation as far as the aphid is concerned on red clover and yellow sweet clover. I would like to call on three or four men who can very briefly give certain aspects of the problem. First of all, I would like to call on Dave Mathew to present the migration of the alfalfa form into Kansas and the known incidences of the aphid on the other clovers.

Dave Mathew: I didn't find this aphid last summer. We found it the first week in April in Meade County and in Sumner County. Andy Frazer and I found this about the same time. From April to the first week in July (alfalfa species) this aphid spread across the state of Kansas. At this same time we could find the other form on yellow and white clover. The aphid found on clover has about four rows of spots, while alfalfa species has six to eight rows of dark spots or spines down the back. Infestations vary considerably in adjacent fields.

R. H. Painter: We are just beginning a laboratory and greenhouse study of specimens picked up throughout the state. We are testing them against different legumes. We are trying to make selections of alfalfa for resistance, hoping that we might find some resistance.

Burkhardt: We had a couple of fields at Marion where the aphid populations were very high. Ladybird beetles began to build up and we couldn't see any difference in populations of the aphids as observed one day (beetles running about 55 per square foot), but in three days they had cleaned out the aphid population.

Mathew: These aphids are quite a problem with alfalfa dehydrators, causing the sickle bar to gum up, and they have had difficulty in the dehydrating process. The alfalfa turns black.

Knutson: Tractors have to clean wheels after travelling 300 to 400 yards through fields. Have to use fire hose or sprayer to clean cutter bars.

DePew: Reports indicate high populations south of Garden City in Arkansas Valley to Oklahoma.

Marvin: In Kansas we were looking for the yellow clover aphid due to advance reports received from Oklahoma and other areas. With air applications we found that parathion in one gallon of diesel per acre gave good results without burning. Should limit swath to 30-35 feet. Oil gives better residual than water.

Dobson: We have used parathion in diesel oil in Pecos Valley, applied by air. Very unsatisfactory and burned alfalfa when applied to hay taller than 4 inches.

Walstrom: We know that the yellow clover aphid has been found in red clover in southeastern Nebraska.

Davis: May 27th survey report shows average of 23 per 25 sweeps in sweet clover and 60 from 25 sweeps in red clover in southeastern Nebraska.

Dobson: It is necessary to stay out of fields until about 10:00 before cutting and baling.

Davis: Estimates place cost of insecticide last year at over $1,000,000 in Imperial Valley of California.

Daniels: We had one collection last season which seemed to be, as far as we know, Myzocallis. Mickle made a survey in the Arkansas Valley this spring but failed to find any overwintering aphids. In July we found it in a number of fields in all five counties in the Arkansas Valley. We haven't seen it to the extent that these other states have had.

Parks: We've had the eastern species, trifolii, for several years with very little damage (Ohio). I think that disease is the contributing factor toward keeping it down in the east.

Daniels: Some beekeepers report bees are going to heavily infest fields for the honeydew. This is confirmed by Dobson in New Mexico.

Lester DePew: The Brown Wheat Mite. I will review the pest briefly since 1950. The U. S. Government decided to locate federal man at Garden City as a result of news articles on the brown wheat mite. Kansas also sent a man out, cooperating with Mr. Hansen, the federal man. They found that parathion at 1/2# per acre was best. Next they attempted to determine the loss in yield, if any -- fork sampling used in test plots. We got 80 to 90% control. Unfortunately, it was very dry last year and there was no significant difference in yield in treated over untreated. We put out some other tests at Ness County (due to the dry, windy conditions at Garden City making poor wheat) where the wheat was much better. There was a moderate count of mites. We treated six fields with jeep-mounted sprayer using parathion at 1/2 pound per acre. We harvested the plots but found no difference in yield. This was due to wet, cool weather a week after treatment, reducing the mites and they didn't build up again. Consequently, we couldn't determine the effectiveness of the spray. This year we had tests in Oklahoma where mite populations were heavy. Used gear type sprayer with 1 pound parathion per acre to reduce mite populations to find out if they reduced yield (five treated and five untreated plots). There is a difference in yield but data have not been analyzed.

Gates: How much did your untreated check yield? Answer: 8-10 bushel per acre.

Marvin: In one county there were over 5,000 acres treated in March. Wheat greened right up. Only one variety, Early Triumph, showed any difference in yield-- 8-10 bushels per acre. We feel that if there had been sufficient rain to give new tiller growth, there would have been a difference.

Mickle: What was the temperature when you treated? DePew: About 80 to 90°

Mickle: What results have you had at 40 to 50°? DePew: Never treated at that temperature.

Marvin: In 1952 Mr. Tilton treated, using two gallons of diesel fuel and two pints of 25% parathion (airplane application) and there apparently was sufficient residue to control mites during cool weather.

Howell: Henderson, now working in Oklahoma, stresses that at lower temperature it must be applied in diesel fuel. Brown wheat mite has moved east and is now around Stillwater. It seems to be a pest only during dry weather.

Knutson: It has been stressed that it is difficult to tell drouth from mite damage. People can get very worked up and blame a lot of drouth damage on mites.

Howell: What are your recommendations when the summer eggs are appearing in large numbers?

DePew: This is difficult to answer for no one has done enough work on this mite. If fork sampling method shows heavy population, and much of the chlorophyll is gone from plants, we usually recommend spraying.

Howell: Well, if practically all those eggs are summer eggs, they won't hatch until next fall anyway. The problem we had was to determine whether they were summer or winter eggs. They weren't uniform. Summer eggs are found as early as February.

Chris Burkhardt: Soil Insects and Insecticides. Soil insect problems in Kansas are not too critical at the moment, except perhaps the false wireworm. (He calls on Mr. Bryson).

H. R. Bryson: We have, principally, three species of false wireworm in Kansas but the most threatening species at the present time is *Eleodes suturalis*. False wireworms build up during a series of dry years. We've had three dry years and they have extended their infestations eastward and we've seen a large number of beetles this year. We did some checking in fields and found them abundant in gopher holes, cracks, etc. This insect lends itself very well to seed treatments. We've used combination fungicide-insecticide seed treatments. The question is whether or not we should make blanket recommendations. We've suggested that, where there are large numbers of beetles, there will be wireworms and that the seed be treated. One field treated with aldrin (2 oz. - 100# seed) a large number of the worms were killed The worms crawled to the top of the soil after they had started to feed on the seed. When these were collected and taken to the laboratory, 65% were dead the following morning. Anyway, the seed treatment looks pretty good. Former recommendation was to plant when there is sufficient moisture to assure germination. We don't know when this will be during dry years when the seed is "dusted" in. Of course, this is when we get the worst damage, between the time the seed is planted and when the plant comes up.

Question: How was the aldrin applied?

Bryson: Applied as a wettable powder, mixed in drill box.

D. E. Howell: We found that the more finely ground powder, plus a sticker, makes the insecticide stick better. One worker tried 32 oz. per 100 pounds of seed and with the sticker, he got 30 ounces to stick. These wireworms don't necessarily need to feed on the wheat. We found that treated seed, rubbed on the worms about the mandibles (in the lab), killed them.

Knutson: I'd be interested in your germination tests.

Bryson: We found that a combination treatment containing lindane did cause some injury. The lindane formulation plus sticker showed no injury, but lindane alone, at higher concentrations, did cause injury, which increased as time went on. We tested some in flats and in standard germinators. Lindane showed some injury to the plants.

Chris Burkhardt: Corn Rootworms. False wireworms are not a problem in corn but may be a problem in milo potentially. Corn rootworm has been our main problem in corn. Comparisons of band vs. broadcast treatment has shown the band treatments much more effective. 50% control, broadcast, compared to almost 100% control by band treatment in one test, 1/2 pound aldrin or heptachlor per acre -- band; 1 pound broadcast -- are recommendations. Adults are in lower population this year. Last year they ran 80-120 beetles per plant; this year 0-30. Some fields were treated for adults. Two pounds actual of DDT recommended for adults to protect silks. This year we are trying 4 oz. and 6 oz. of dieldrin, both in water and oil and are geting good control. Dieldrin is being used due to grasshoppers being present. *Cocinellids* seemed to be very little affected at these rates.

Gates: Are there any natural control factors for corn rootworm? How about in Colorado?

J. L. Hoerner: Not that I know of. Crop rotation is recommended and seems to work. Worms seem to be building up.

Walstrom: Rootworms seem to be heavier in spots in Nebraska this year.

Marvin: Where beetles have been treated one year, how does this affect the population the following season?

Burkhardt: There seems to be a very definite reduction of larvae the following season when the beetles were controlled in the previous summer or fall, if killed before too many eggs are laid. A late summer application probably allows too many eggs to be laid before the beetles are killed.

Mickle: Have you any experience with the application of an insecticide in combination with commercial fertilizers applied in the fall, as a control for larvae the following season?

Marvin: In Illinois they have had good results with this method. They used two pounds of aldrin, or heptachlor, per acre. (This is with the other species of corn rootworms).

Lou Davis: I think we're going to hear a lot more about the use of soil insecticides in the future, against economic pests. In the reorganization of the Bureau to the Plant Pest Control Branch they've dumped a lot of things on the Branch, the golden nematode, root rot nematode, soy bean nematode, boring nematode, and other

G. I. Reeves: The Alfalfa Weevil. The swan song of the U. S. Bureau of Entomology mentioned the alfalfa weevil in about a dozen places. As a result of alfalfa weevil investigations will probably never be anymore fully published. In 1909 the alfalfa weevil was almost totally unknown in America. The type specimens in existence were scattered throughout European museums, and was almost ignored due to the confusion of its identity and to its infrequent damage. Alfalfa was not as prominent a crop in Europe while in Western America it was one of the most important crops. The weevil ran wild in America because conditions involving the neglect of most alfalfa fields favored its increase. The weevils ability to subsist on various legumes has favored its spread. Oviposition begins in the fall, continuing as weather conditions permit. In Oregon this would occur almost all winter. However, they don't hatch until much higher temperatures are reached. Consequently, one warm day in spring the eggs nearly all hatch at once. During colder weather the eggs are usually laid in soft stems lying on the ground, than in the green stems. The larvae feed on epidermal cells and then they feed on the developing buds, affect the plant like frost. In fact, the plant must be clipped before it will resume normal growth. One adult female may produce as many as 500 larvae (1500 under laboratory conditions). There are often more than three females per square foot in badly infested fields, consequently more than one larva per bud. It is possible to prevent damage by cultural methods; by shade, or by thickening the stand by reseeding alfalfa. In the absence of these, however, practically all the weevil larvae are doomed to destruction by Bathoplectes larvae. This lasts until the first larvae spin cocoons. From this time on the parasite can't keep up. Practical farmers cut their alfalfa prematurely during serious years. This reduces the damage the following year. Then the next year they relax to old habits and again get serious damage.

Lou Davis: In the east the alfalfa weevil was found in Maryland in 1953. It actually was found a year earlier but specimens were set aside and overlooked. Now it is in North Carolina, Virginia, West Virginia, Delaware, Maryland, Pennsylvania, New Jersey, and two weeks ago it was picked up the first time in New York. Damage is much more impressive than in the West. Due to the planting of alfalfa with grasses, the individual alfalfa plants are subject to attack and are seriously damaged. In the West, solid stands give shading and less damage. In the West, the spread has been eastward in South Dakota, northward in North Dakota and into Assutan County in Washington. Bathoplectes is pretty well established in the east. Only three quarantines in effect today -- Kentucky, Wisconsin and Michigan.

Knowlton: We are concerned over use of chemicals on alfalfa seed crops. In Millard County parathion killed off large numbers of pollenators -- honeybees and native wild bees. Parathion is now being used for yellow clover aphid, also some malathion. Mr. Knowlton is interested in the use of systox to control aphids on seed crops. States need for this type of information.

Painter: What stage of the alfalfa for seed is the right time to treat for yellow clover aphid? If you find aphids in abundance in late bloom stage, do you gain anything by treatment? No answer.

Dobson: When is it practical to treat?

Marvin: Reports that in seed alfalfa, using toxaphene for other insects, the yellow clover aphid has been held below economic levels. Toxaphene would not be as toxic to the bees as parathion.

Allmon: California is using a combination of toxaphene and DDT. This does not give complete control but suppresses them.

Ray: Residual action is not too good with any insecticide.

Dobson: There is a residue problem on chaff which is fed. Most of it is fed in our country.

Titensor: Is systox federally approved for use on alfalfa?

Answer: On seed alfalfa.

Titensor: Label reads twenty days.

Knowlton: California suggests systox on alfalfa, 6 to 8", but Mr. Knowlton doubts if this will control yellow clover aphid if applied much later, as during bloom period.

Dobson: In treating alfalfa in bloom we found that the populations of wild bees, following treatment, were non-existent. Systox sprayed in early morning was not toxic to bees. Systox controlled yellow clover aphid for about ten days when used at 2 to 4 ounces per acre. Usually one can remove crop before they build up again. There is no difficulty in killing yellow clover aphid in New Mexico, but they build up again rapidly. Winged forms may be found again within two days following the use of malathion or parathion.

Howell: We've never seen any systemic action from systox, but we do get kills, quick kills. Can't get control for more than ten days with anything.

Quist: Worked with systox vs. honeybees. Noted marked repellent effect in the state of Washington. Bees avoided fields treated for 48-72 hours. Tests on honey showed no accumulation of systox.

Mickle: Does any state other than Colorado have problem with mites in corn?

Howell: We find mites building up on corn in greenhouse (in work on southwestern corn borer). Didn't find any material that would control southwestern corn borer and mites at the same time.

Painter: Reports that at altitude of 7,000 feet in Guatamala and at higher altitudes in Columbia, mites (T. bimaculatus or closely related species) is serious problem in corn. It is the last arthropod pest to disappear as you go up the mountains in Latin America.

Knowlton: Asks question on nomenclature in last survey report on bi maculatus.

Davis: Explains that they have tried to be sound in nomenclature use and when change is made to give sufficient information to bridge the gap.

Daniels: Asks of Dr. Painter if they have mites in corn in Kansas.

Painter: No. Not that he knows of.

Mickle: What about Garden City area? We (Colorado) have them at Lamar.

Burkhardt: Not a problem. Very little corn grown in that area.

Hixson: There was a problem two years ago in Nebraska when road sides dried up. However, mites disappeared when they got rain.

Parks: We have had corn samples brought in, showing little or no germination. Examination showed seedlings covered with white mites. Had not seen it before. Asks if anyone else has had experience with it.

Thatcher: This season we received reports from some small areas that germinating seeds were being attacked by Tyroglyphid mites, scavengers, apparently concurrent with fungus.

Newton: Mites have long been a problem in corn on Western Slope (Colorado).

Ramon Garcia: We always have a problem with mites, principally the two-spotted, in corn in Mexico.

Mickle: Reports that mites begin to build up on corn in hot weather. One farmer in Arkansas Valley (Colorado) treated half of his field and left the balance untreated. His treated portion yielded 25 bushels per acre more. Losses in ensilage are also heavy. Have used several materials. Aramite gave good control in 1954 but preliminary examinations in July (1955), aramite was disappointing. FW-293 (Rhom-Haas) dust and also 10% Ovotran looked good. Dust was applied by aircraft — 40 pounds per acre. Mite is T. bimaculatus.

INSECTS AFFECTING MAN AND ANIMALS

General Chairman - Herbert Knutson

C. A. Sooter: Mosquitoes and encephalitis. Our problem at Greeley (Colo.) is ecology of viruses affecting the Western and the St. Louis equine encephalitis picture. Encephalitis is probably the most important mosquito-borne disease in the mid-west, especially in irrigated areas. It can be rather severe. Last year there were about 1000 cases which proved to be the St. Louis virus in the Rio Grande

Valley of Texas, and they have been able to isolate the virus consistently from *Culex quinquefasciatus*, and in one chicken house there they can pick up the virus at any time (southwestern Texas). We didn't follow the picture in this area too closely but believe there were about 400 cases of the St. Louis type in Kansas last year. Not all of them were proven but a good portion of them were followed; more cases than anticipated. The St. Louis type appears to be coming back. At Greeley we have been working for four years trying to identify the maintenance mechanism in nature and spread from host to host, where it (virus) is during non-epidemic periods and during winter. Past investigations the picture was thought to be: from mites - to birds - to mosquito - to birds - to mosquito - to horse and man. This gives pretty much of a dead-end. Mite picture is pretty much thrown out now. The cycle now is thought to be: Mosquito - to bird - to mosquito - to man or horse, with possibility that overwintering is in main vector *Culex tarsalis*. Now we have some indication that latent virus can be pulled out of birds after as much as six months -- another possibility of overwintering. We are working on possibility of migratory birds from South America and other areas picking up infection there. Does fatigue from flight cause virus to become active enough for a mosquito to pick it up in the spring? Also working on possibility of snakes being overwintering host. Have actually been able to inoculate the garden snake with Western virus and recover virus. Mosquitoes will feed on snakes readily (*Culex tarsalis*). Snakes have developed Anti bodies against Western equine enciphlomylitis in test this spring. We are feeding laboratory-reared *egyptii* and *tarsalis* on snakes, trying to pick up virus of latent stage from snakes. Also studying the fat bodies in connection with hibernating mosquitoes. Is the fat developed from vegetable material or is it necessary that they take a blood meal to develop the fat? If they can go into hibernation without carrying the protein from a blood meal, then not likely to be carrying virus into hibernation. Mosquitoes reared in laboratory do not do as well when placed in hibernation as those in nature. When temperature reaches about 50-70° F. in soil, *tarsalis* will come out of hibernation. This year the first emergence was recorded on April 17th. *Culex tarsalis* collected this spring (from hibernation) failed to produce virus. Does first blood activate virus, or does the mosquito pick up? First blood in spring studied to determine nature of meal. The first *Culex pipiens* were picked up last winter. One Denver storm sewer had perhaps 100,000 specimens. *Culex pipiens* is a very poor transmitter of Western but is very high for St. Louis. This summer we are running tests with five stations in Greeley area. Know virus has been in the area this summer (1955). California is behind last year in the number of cases. The modified stable trap is used for *Culex tarsalis* trapping. We have modified some of our single pigeon cages. Negative birds placed out in spring are checked in fall. This gives comparison of amount of spread with infection found in mosquitoes. One of Dr. Hess' problems now is to standardize sampling methods to determine when *tarsalis* population is high enough for control (sanitarians). Experimental control is to be carried out to see if it is feasible. This work is being done at the Logan field station, also in Montana and Colorado.

Daniels: We have been working here 2-3 years with State Health officials on mosquito and fly control programs. Dr. Hess of the Greeley Station is working with us. We would like to get out a publication similar to the one recently published in Kansas.

Sooter: Messrs. Rachels and Louis Ogden of the Public Health Service are available for assistance on state programs.

Knutson: How many cases of encephalitis are reported by local physicians, and how many cases are backed up by laboratory diagnosis?

Sooter: The 400 cases last year were human and diagnosis was made by local physician in many cases. Diagnosis not too good in all cases. The Kansas office checked with Chicago office. If you get 10 to 20% confirmation, you are doing good.

Knutson: In the Massachusetts outbreak in 1939, of 31 cases 20 were fatal; others were permanently injured mentally. How does this compare with Kansas?

Sooter: Eastern virus death rate is much higher. It will kill birds. Western won't.

Gates: What birds did you check?

Sooter: Barn swallows, fence swallows, western and eastern Kingbirds, and migratory water fowl, crows (in Kansas); finches -- to see if virus coming from north, greater yellow legs.

Thatcher: How were laboratory reared mosquitoes prepared for hibernation? Special feeding?

Sooter: They were held outside for about a month and fed sugar solution. It was found that some of these, having no chance for blood meal, did develop fat bodies. Asks for information on mites feeding on snakes.

Howell: We have taken same mite from snakes and off birds. They might be a generation apart, however.

Sooter: We have worked with nasal mite but couldn't isolate virus. There may be a specific nasal mite, however.

FLY CONTROL

T. H. Parks: Observations on Performance of Baits. Assuming that a good sanitation program is in effect, where are we with dairy barn sprays, wall sprays, etc? The housefly is a dairy barn visitor. DDT, lindane, and all of chlorinated hydrocarbons have fallen down. We are now at the phosphate materials -- malathion and, under some conditions, diptrex and diazinon are approved. Also there are some experimental insecticides. The best we have been able to do is three weeks control with phosphates. It is advantageous to use baits with residual chemicals in combination in strategic places. My observations are confined to the county in which Columbus is located. My associate, Dr. Lyle Bowman, has been working with baits. We believe that baits are satisfactory, supplementary to wall spraying, in dairy barns, including milk processing rooms, although not all materials have been approved by FDA in processing rooms. For dairy bars around city and garbage cans baits give variable effect. For fruit stands they give best response of any. Dry baits did marvelous job. They did well in meat processing places -- butchering, sales rooms. Baits performed very well at University of Ohio butchering rooms -- want nothing better. In livestock pens, with competition of manure, sanitation will not do away with all animal odors in manure, hence there is competition. In sheep barns they worked well. Sheep not in barns in daytime. In hog barns they work only partial. They are of valuable assistance but will not completely control flies. We have done some work in the University. "Hog evaluation" pens -- three long pens 200' x 10' open in front, closed in back, with ventilators. Hogs supplied by growers for University to feed out and develop desirable breeders. Hogs never on pasture -- fed balanced rations in pens. Pens cleaned thoroughly every other day. Probably not breeding but flies are attracted. Don't want to spray due to visitors looking at hogs. Want something else. Baits -- diptrex liquid bait used. Found out you don't have to spray liquid type bait -- can make it up concentrate and smear it on at strategic spots. In the beginning we used paint sprayer. It has lasted a month and haven't sprayed since. But I have been applying smears on posts and pens and on a conduit over pens, ventilators at rear, and best -- on top of closed pens at rear, also on chains that raised lids of the closed pens (opened for cleaning). Chains appear ideal. Have found immense number of flies under chains. Flies like chains because they can rest in any position. This is small area and the odor of bait competes with odor of manure. Flies roost on chains at night. So successful that we are experimenting with chains in dairy barns. Manufacturer of insecticides suggested that we had better leave dead flies. They think odor of dead flies attract flies, and we think so too. So we don' remove the dead flies. People from the state come there and marvel at the number of dead flies. They immediately want to go home and do it themselves, but we don't have any publications on this yet. I think the dry baits will handle the problem in fruit markets, butchering rooms, meat processing rooms, dairy bars and are quite helpful in milk rooms, washrooms, gasoline station rest rooms, and many other places, but they won't do everything. Experiment Station at Wooster will work more on the problem. What I have said applies to houseflies and blowflies.

Howell: What is your dry bait?

Parks: 1% malathion or diazinon. Attractant used being kept secret by manufacturer.

Knutson: A 1% bait adsorbed on hard material will do about the same as a 2% bait absorbed, so depends upon kind of material used as to effectiveness of a 1% or 2% bait. A day of high humidity reactivates the bait, no stain.

Question: Did you have trouble with diazinon?

Answer: We didn't use it. It is our job to find out the usefulness of dry baits.

Sooter: Are there ever accidents in connection with use of baits in butcher shops, etc.?

Answer: Greatest difficulty is to keep people from over-applying. Tell them to use it thinly on window sills and where sun hits floor. In meat rooms use on sills and floors where sun shines in.

Mickle: In regard to recommendations for liquid bait in hog pens, do you follow directions on label?

Answer: Manufacturer didn't know too much about this and had to feel his way along.

Howell: Did you try varnish baits, such as toxicant plus syrup?

Answer: That's exactly what we use: 1 pound of diptrex in 1 quart of water and 2 quarts of karo.

Marvin: Does public health have the idea of not using it in food processing plants because of fear of dead flies falling into products and not from standpoint of the toxicant itself? No answer.

D. M. DeLong: Companies won't sell diptrex straight. We have been using DX199 (50% inert). We take soluble material out and use it and it works beautifully. We use DX199 and double it. We have 100 super markets this year where we are testing, from New York to the Ohio River. We are taking the tests of diptrex along on some of those. Then we're using dry baits in windows at nights. Also dry baits in garbage sheds and outside. Working very well. On blowflies our test counts still show 60% or more in super markets. Housefly minor problem. Lucilia sericata is principal species attracted to fruits and meats.

DeFoliart: Blowflies in Wyoming attracted to sugar baits away from molasses sweetened dairy feeds.

Howell: What do you do in average dairy barns where you do not have nice clean surfaces to apply baits?

Parks: We use varnish instead of baits.

Howell: We are using three different types of baits: (1) 1 or 2% dry sugar bait for clean, dry surfaces; (2) in windy barn, use cornmeal type bait which works in some places; (3) in area covered with litter we use oyster shell type. Usually add peanut oil to (2) and (3), or some attractant. We are interested in effect of color. Yellow seems to be most attractive but not as important as we thought it might be. We don't like dyes that will run. People tend to use too much bait and then on humid day it (diazinon) runs, making a messy appearance. We tried chain method but our farmers don't like chains hanging down so we like the baits, but they won't do it alone. They need help; need residual spray first to knock down population. Dry baits have a place but need more than one type of bait.

Parks: There is much yet to do in the use of attractants. For instance, last year one of baits had diazinon in it but it was one of the poorest performers, when we tried to measure its effectiveness. We all think that was due to its poor toxicity but the company is trying to get an attractant for they said lack of attractant made it fall down. They probably will soon have something that will make it better. We have eliminated TEPP. Although a good performer, it was taken off the market as a bait.

Marvin: There seems to be a good indication that baits as larvicides, using weekly applications in privy have cut down fly populations tremendously.

Knutson: We have just been visited by Mr. Keller from USDA laboratory at Orlando. He is experimenting with a 4" x 6" piece of screen wire, using paste bait (50%) plus sand, 2% malathion plus agar. Used on five farms and has been materially reducing populations. Flies climb higher off floor than in Florida -- behave differently -- disperse much more.

Howell: Our experience is that late in the fall baits are very poor. Flies do not go to floor.

Knutson (To Howell): You're pointing out how differences in habit affect effectiveness of bait. However, this was during hot summer in both places. This is a difference in fly behavior in two different geographic locations.

DeFoliart: We can't get bait down low enough to kill flies. Livestock will lick it off.

G. R. DeFoliart: Horn, Stable, Horse Flies and Mosquitoes. I meant to say something only about mosquitoes when I came here. We've spent the last few years working on mosquitoes in Wyoming. Calves are placed in cages with mosquitoes. We are not making too much progress. Main conclusion reached so far is that mosquitoes are misplaced on most cattle spray labels. Instead of listing them with hornflies, at long intervals and weaker dilutions, they should be listed with tabanids and stable flies. The longest protection we can get is 48 hours. We've used chlorinated insecticides, including BHC. The best material was activated pyrethrins with pyrethrin content high, at least 1%, includes pyrenone and sulfoxide pyrethrins. With this we get about 90% for the first few hours, and it drops down to about 70% in 24 hours; by the end of 48 hours (and I'm stretching a point to say that we get protection for 48 hours) we get 40-50% protection. It is of no use for beef animals. Have approached this by using back rubbers. We let sacks hang rather than to wrap them around the cable. (Don't jump me on the economics of this yet). Two years ago when we first used this device, a rancher said cattle would come by five to seven times daily. Counts indicated reducation in tabanids was 35 to 70%. Chlordane used. This year we are using wool sacks, 84" x 36". The lower end is rolled up 18" in the stick. Attach opposite end to cable. Roll it up so that about 40 inches remained hanging. We are convinced that animals can hit about 90% of their bodies -- all except belly and lower legs. We have difficulty in getting cattle to use them in the field. There was no central gathering place for cattle on ranches tried. Of four put out, two were never used. On dairy herd driven through twice daily, mosquito reduction was 45 to 90%, tabanids 60 to 80%. These are just indications and this is the way we're approaching the problem. (He questions the economics of this at present). Dusting method for hornfly on dairy cattle is really catching on. Dusting beef herds with roto duster, using 50% DDT, is as fast as spraying and length of time of control is almost as long, about four weeks in Wyoming.

Sooter: How would you compare losses from mosquitoes with losses of hornfly?

DeFoliart: I would say the mosquitoes are not as bad. Feeding time is shorter-usually evenings and not through the day except when cloudy and wind is not blowing.

Sooter: What species?

DeFoliart: Haven't checked all collections but believe them mostly Culex tarsalis.

Sooter: At Grover, Colorado we get some reports on mosquitoes following showers. Dairy cattle and horses have to be put up for a week at a time.

DeFoliart: In our area it is mostly a problem of irrigated valleys and in the mountains. Mosquitoes show up about mid-June and last for about six weeks.

Howell: What tabanids do you have?

DeFoliart: Main species Hymenogera contalis. It is not a top feeder -- feeds over body and a large percentage underneath. Chrysops fulvaster is probably main deerfly.

D. E. Howell: Culicoides. Culicoides is usually considered a minor pest in Oklahoma. Appears only in periods of drought. Example, when North Canadian River dried up, the cities dumping sewage in the river made high organic content and culicoides built up in tremendous numbers and killed a good many livestock and poultry. Within the past two years the disquieting news that we had "blue tongue" in Oklahoma made us look again at the Culicoides picture. We knew of their breeding habit in high organic content water and in tree holes. We used modified Jersey mosquito light trap, as survey method, plus animal trap. Found out that most Culicoides were breeding around watering places. Just a little footprint, caged, might yield as many as five species. Showed that we had a tremendous number of species. We don't know if they are vector for "blue tongue" and, if so, which species. We do know that they are relatively well correlated in their distribution. We now know that we have fourteen species and several sub species. We have eastern forms and western forms. We seldom have complaints of them biting animals but they come right through screens and bite people. They cause a lot of comment, especially after a warm, still night. They also cause "entomophobia". People, just thinking about insects, begin to itch -- a problem. Biting limited to two or three species. Culex varipennis is principal species. Mosquito traps throughout the state show Culex varipennis, Culex gutapennis, and two or three other species to be widespread. Others limited to the dry area breeding and correlated, to a certain extent, to the sheep areas. We don't have all the answers.

Sooter: How far will they travel?

Howell: We don't know. They seem to move much further than we originally thought.

Thatcher: We had some cases of blue tongue at Longmont. Sheep were driven away from brush and water, always in the vicinity of irrigation lakes. Farmers thought mosquitoes were driving sheep away. We found Culex varipennis in the area — think these were causing sheep to move.

Sooter: We found them common in Grover area and there is no high organic breeding places there.

Howell: I think we need to revise our opinion of what Culicoides does and where it breeds.

D. E. Howell: Rabies in Bats. Bat bites caused rabies in Florida two years ago. A rabid bat bit a lady in Pennsylvania turnpike restaurant. The bat was shown to have rabies. The Texas people and U. S. Public Health people have shown that they have rabid bats, both in solitary and in colonial bats. The Public Health Service put in a sizable grant for the Oklahoma institution to study this. It was a cooperative project involving the State Dept. of Health, Dept. of Zoology, Dept. of Parasitology and Dept. of Entomology. There are enough epidemiological suggestions to make it seem that arthropods are spreading rabies from bat to bat. Therefore, Oklahoma contribution is a study of bat migrations, and of the arthropods there. Bats have been banded and they been recovered up to 500, some 700, miles away. We also know that the cave where the latter were taken has bats banded in it from down in New Mexico, which have direct contact with the Vampire bat. Picture is unhappy. We go into some caves and select bats, that is, those that are flopping around on the floor, taking notes, take out the hippocampus or brain, make smears to look for negative bodies. Half of brain is stored in glycerin. If the examined half is positive for negative bodies, the hippocampus is then injected into laboratory animals to confirm the evidence of rabies in bats. Seven species have been incriminated from east coast to Texas. We have caves where 10% of the bats caught show positive negri bodies, and positive inoculations. Where do the arthropods come into the picture? We are finding that we know almost nothing about the arthropods of bats. The Nyecrobiids, Streblids are present in amazing numbers. Bats in caves are found in all stages of decomposition. Bats that fall to the floor are attacked immediately by arachnids (ticks and mites) and dermestids. These also get on us so it is "a delightful place for a biologist to go". Some bat caves never get below 95°F. while others never get above 50°F. Odor of ammonia is tremendous. It is an interesting problem and one we'll be working on for a long time.

Sooter: I'd like to add that there have been further reports on rabies in bats in Southern California and at Hamilton, Montana.

Howell: I would like to add that plasmodium have been discovered in bats for the first time on this continent, also trypansoma, and twelve new species of helminthes, also nine species of mites. By using a washing technique we recover tapeworms, ticks, mites and fleas.

M. T. James: Parasites of Minks and Foxes. The insect that we have been concerned with is a sarcophagid fly, Wohlfahrtia opaca. This insect has a larva which parasitizes the young of various animals including a very young human infant in areas where this insect occurs, but the condition in man is of minor importance and can be quite easily controlled so it is not serious. The fox farmers, being unaware of this situation some years ago, started losing some of their young litters. Dr. Frank Gassner (Colo.) and I started studying this insect in Colorado, publishing two papers on it, one on the biology and one on control as we knew it at that time. Recently National Fur News asked for an article which was published. Not long after this we were invited by the Mink Growers' Research Foundation to submit a project on the biology and control of this parasite. Jerry Craft (Calfiornia) was employed, who reported for work last September (1954.) He immediately got to work collecting material from the field and trying to develop laboratory colonies of the insect. In the past Dr. Gassner and I found our principal problem was that we were unable to rear colonies in the laboratory. Almost always they refused to mate in captivity. For several years we had reared wool flies and flesh flies on another project so that we had developed a room of ample size where we had control of light and relative humidity. Cubicle cages, 40" x 50" were used and the flies introduced into these cages. The eastern species Wohlfahrtia vigil have been commonly observed resting on railroad ties and on the rails. Requirements in nature are heat and bright sunlight. Jerry conceived the idea of introducing heat and light, temperature of 90° to 100° constantly. The temperature of the room was held at approximately 80°, relative humidity of 50%. He was able to get mating and oviposition, or rather larviposition, since most of the sarcophagids are larviparous on fresh meat. I have the opinion, backed up by experience and reports, that these larvae are obligatory parasites, also western species, opaca, is believed to be. It was rather surprising that we were able to rear these insects on fresh meat. We have obtained specimens from the young mammals, adult bats, and rarely from adult mink and foxes, and only when the animal was weakened from one cause or another. The problem of developing laboratory colonies was a major obstacle in the way of testing insecticides and made it necessary to base control recommendations on circumstantial evidence. There were severa problems on the biology of these flies. Most sarcophagids will breed through the season continuously. It looked as though there was a spring and a fall generation of Wohlfahrtia opaca. We would get the adults in the spring at the same time the young fox and mink were being parasitized. We would get the adults that were emerging. We knew that the third stage larvae could continue to develop on the carcass of dead animals. We knew that they were saprophagus to this extent. We had not succeeded, however, in getting the larvae, younger than third stage, to come through -- those that were sent to us. One problem then was how the insect spent the summer, and where the fall generation came from. In 1948 one of my colleagues brought in a rat which was on its last legs and which he had run down, and it was infested with over 50 larvae. That suggested that rodents, and perhaps adult rodents, were the fall hosts. We then began to pick up adult W. opaca elsewhere in the summer. Adults were attracted to freshly killed rabbits in Central Washington, which is dry. This may have been an attempt to "blow" fresh carrion. If the insect is a carrion feeder, or fresh meat feeder, it may explain how the summer is passed. At any rate, we have come to the important place so far as initiating control measures is concerned. The mink ranchers research foundation has renewed our grant for another year. We hope to initiate control experiments and to be able to give mink growers practical recommendations for control next year.

L. Anderson: How did you get the proper heat and light?

James: Jerry placed transparent light under it and used a piece of frosted glass, 4" x 12". This gives light and heat and flies are attracted to it. We leave a part of the cage so that it can be shaded. The rest of the cage is out in normal light. Adults were fed only sugar and water. Constant supply of fresh meat is kept in cages so adults can larviposit when they so desire.

D. M. DeLong: Artificial Rearing of Mosquitoes. For the past seven years we have been studying mosquitoes. Working on the reaction of mosquitoes to various chemical and physical factors in attempting to simplify the rearing process, we got into a basic study of nutrition. Complete report will be given at the E.S.A. meetings. This is a progress report. We first took reserve blood on cotton pads, to feed to the mosquitoes. This was done by putting an aquarium warmer inside a test tube and then wrapping cotton around it, keeping it at body temperature. Mosquitoes went to it readily. We were working with aedes and anopholine mosquitoes. Now the difficulty with this is that, in using milk, it goes to the diverticulum instead of the stomach so that the eggs are produced only in small quantities as the milk is used slowly. The blood goes immediately to the stomach. By using certain enzymes with the milk, we could get the milk to be used much faster and produce eggs much faster. So this was the first step in the procedure. We tried a number of proteins, both plant and animal, also the hydrolyzates of such proteins and found that any of those not deficient in the essential amino acids would stimulate oviposition. At first we fed a mixture of 18 amino acids together with 5% levulose and 5% dextrose. And with these we could obtain plenty of eggs. We wanted to find out what the limitations were. So we eliminated each of the 18 amino acids, one at a time, and found that there were eight acids which were absolutely necessary for egg production, four others markedly affected egg production, but are not absolutely necessary for egg production. Then we made up a standard media, using the eight plus four amino acids, ran a series where the concentration of each acid was varied to obtain an optimum concentration of each. Then we took the optimum value of the twelve acids and made a second standard and repeated the variation series again, arriving at an optimum or critical amount. Now, some of these can be substituted for one another without much change. We plan now to take the 12-acid standard and to add singly the acids now omitted to see if they will increase egg production. By using this combination, we have succeeded in raising aseptically, the aedes larvae on this amino acid complex. We are next working on eliminating the vitamin problem, if possible. We use 400 female mosquitoes in a cage, taking daily egg counts. The food mixtures are renewed every second day. With the 8-acid standard we get about 150 eggs in 14 days. When we add the 4 other acids, we get about 7,000 eggs in 14 days. We keep the mosquitoes on a 10% dextrose, after emergence and before the tests are started. Eggs are not produced until after the 4th day. We are studying this only to see what is essential in the way of organic materials for egg production.

Sooter: Will they bite man readily when reared this way?

DeLong: Oh yes, and I might say that you can get a few more eggs from the blood than you can these. But the difference is not sufficiently great to make a difference in the lab. due to the difficulty of getting blood. We freeze the blood and can keep on hand a 6 months' supply. Milk or amino acid media are much simpler to use.

Sooter: Do you have any difficulty with water you use?

DeLong: We do use distilled water in the lab. but that is not essential.

Anderson: Is it simpler than using a host, such as a chicken?

DeLong: Yes, and it is much more critical for aedes than it is for anophiline. It is harder to rear the latter.

Rodeck (to Sooter): Your speaking of heating tubes, reminds me that earlier today you mentioned feeding on snakes. How is it done?

Sooter: We simply have a plastic screen cage into which we put C. tarsalis or A. egyptii and then insert the snake through a gauge sleeve.

Rodeck: Do mosquitoes feed on snakes in nature?

Sooter: I think so.

Robb: Can we have a report from Dr. Howell on the work in Oklahoma on cattle grubs?

D. E. Howell: Phenothiazine in Cattle Grub Control. We had a flood of questions after the B.A.I. work, so we had to set up a test. We had a cooperative test involving 5,000 animals, involving use of phenothiazine in several ways: First we used phenothiazine in feed at 2 grams, 3 grams and 4 grams daily and so far have not had difficulty in getting consumption. Next, with salt blocks, we have not been able to get consumption. In mineral mix plus molasses we can get consumption of about 3 grams daily. We are trying to see if it does any good, and when it does any good. We start the first tests in February running into May. Another series of animals start in June and run until last of August. There will be another series of 500 animals running from last day of August until approximately March 1. Now all of these animals are getting an average of 3 grams daily in two doses per week. We won't get the answers until March. Our grubs are getting the nasty habit of coming out in July, August or September and then the big flush from October — March. We don't have the answers yet.

Mickle: Has anyone done any work on larvicides as a method of house fly control?

Howell: We have been working on larvicides and under cage houses we find that dusting with one of the organic phosphates is excellent. We can use sugar bait at 1% or 2% sand and malathion, sand and diptrex, or sand and diazinon. All do a good job. On concentrate manures, where we are using calcium cyanimids, such as hog pens, we scatter granular or powdered form over the top, preferably granular because it doesn't cause the surface to crack as badly, allowing the flies to go in beyond the treated surface. Manure contains much higher nitrogen level when treated with calcium cyanimide. We don't get complete elimination of larvae but you get almost no emergence of the adults. Stillwater, privies treated with BHC in privy vault produced more flies than the untreated. This was supported by similar data from Public Health Service. Sodium arsenite was used as 1% liquid. This is caustic and must be used with care. It does a nice job so long as there is enough liquid in the vault. It will control breeding at low cost. There is one catch, there are a lot of shade trees that have their roots down in there and will be injured.

Anderson: How do you explain the failure with BHC? No answer.

Knutson: A study with chlorinated insecticides at an army camp with repeated applications showed that BHC and more strikingly, dieldrin, with one application of an insecticide there was very little resistance shown in the fly but the reproductive capacity increased per day per plot but no increase in longevity of the fly. And that reverts back to the second and third generation. On a ranch where no insecticides had ever been used, we collected and sprayed fly populations to the fourth generation and we have found longevity increased indicating longer reproductive periods.

Sooter: How about the other predators?

Knutson: Our studies were made on an unsprayed ranch. (To Del Gates): Del, how is the 1% diptrex working on the cockroach?

Gates: It seemed to be very, very good, as a sugar bait.

DeLong: It works well.

Parks: The American Entomological Society meets at Cincinnati on November 28th to December 1st. There will be a slate of new officers voted upon. There will probably be at least 7 or 8 candidates; one of these candidates, with his approval, will be Dr. George List, and we all know who you are going to vote for.

STORED GRAIN INSECTS

E. Hixson, General Chairman

Stored grain insects problem is important. We as citizens have a large investment under the farm price support system. We usually say that is a problem of the government. We must remember that we are the government. If F.D.A. ever starts enforcing sanitation laws, we are going to have more problems than we ever heard of and grain will not be able to move into commercial channels. Now we will take up a new pest, the khapra beetle.

R. C. Dobson: The Khapra Beetle. I came up here last year talking about a pest you probably had never heard of. We hope you never have it. We are on the fringe of the investation at the present. It was picked up last May. In February Colorado instituted an embargo type of quarantine against Arizona, California and New Mexico. At that time New Mexico had no law, no department to look to, so the Dean of the College appointed me to the job. The Federal hearing in Denver also forced our hand. We had picked up 3 infestations on Arizona certified sorghum seed. In all, there were less than one dozen specimens. Seed had not been purchased, due to dry season, and was held over. All three warehouses were sprayed with 40 lbs. of 50% DDT per 100 gallons of water. In addition we fumigated all stored grain in the immediate area. In Denver we found out that the khapra beetle can walk through 100% DDT and not be phased. We used standard fumigation methods, and found out these are no good against this beetle. So we were right back where we started. I was taken from Extension and started inspecting -- from the 12th of December to March. We've now completed inspection of everything in the state, discovering one additional infestation. A Federal man was sent in and we fumigated these infestations. Buildings must be packaged, or wrapped up air tight in nylon tarpaulins. We used 4 pounds methyl bromide per 1,000 cu. ft.-48 hours. Concentration must not go below 2 lbs./1000 at any time so we had to add fumigant. It was difficult to hold tarps on in eastern New Mexico due to wind. At a Phoenix meeting we found we were allowed to take buildings out from quarantine if they were completely wrapped and fumigated before May 1st. Then if, after monthly inspections, it remained free of khapra beetles until November 1st that same year, they could be taken out. This coincides with the normal growing season in New Mexico (Clovis area). Buildings that were fumigated without being wrapped will be under quarantine for two complete seasons. If at that time no new infestations are found, New Mexico will come out from under the quarantine. California and Arizona have slightly different situations. California apparently had the beetle in 1946 but didn't recognize what it was. They fumigated an alfalfa warehouse with standard methods in 1949 and about 6 weeks later the place was crawling and they began to get worried. They sent specimens in to Washington in 1952 and they were identified as the khapra beetle. By this time the original infestation had spread and, as a matter of fact, the man who had owned the building had abandoned it but he took a bunch of sacked grain, used for partitions, and moved them into a new building. California now has over 120 known infestations, the majority on farms, but the big commercial outfits are almost all infested. Arizona has 80 some infestations. In Phoenix the Capitol Feed and Seed Company covers a city square block, and they are now thinking about covering the whole thing. I'll be surprised if they can do this so that it holds up. The Dow people assure us they will make enough methyl bromide for our needs but will have to triple their production in order to handle all the needs. In New Mexico we now feel that we have no infestations. We have been over the entire state once, and about half again. We're picking up all farmers that bought Arizona certified seed last year and in 1952 and 1953. This insect is the toughest stored grain insect to control, I believe. It can live in grain of 2% moisture. It won't reproduce there but will live until moisture conditions become favorable for breeding. The larvae can live for 3 years or more without feeding. The reproductive cycle is about 6 weeks and each female will lay about 300 eggs. They don't fly, fortunately. At least we don't think so. They are called khapra beetle because in India this means "brick". They become so numerous that by force they go right through the cracks in cinder blocks. In Arizona they cleaned out a solid concrete pit thoroughly and the next morning the beetles were about 1/2" thick on the floor, and there were no entrances near it, except through the blocks. They insist on a "wrap-around" job because the beetle can escape through any crack or crevice. One nice thing about this pest is that, while they feed in grain, they will come out to shed their skin and to pupate. They shed their skins on a burlap sack or on walls and other areas. A large percentage of them are forced to stay in the grain. However, it is not necessary to go through every pound of grain to find them since they can be found on burlap sacking, under boards, etc. Regulations are not always written by entomologists, but by lawyers, and are sometimes difficult to understand. At present I believe shipments of grain from Arizona, California or New Mexico can be accepted in any state if accompanied by inspector's certificate. This quarantine is peculiar in that it is a "premise" quarantine, rather than state, or locality. We think this has been very effective.

Lou Davis: In addition to what Dr. Dobson has said, I thought you might be interested in a few other points. There are 14 species of beetles in the genus Trogoderma, and 7 of them have been found in California and the surveys through 1954 to the present have shown some interesting things. There are two species that have shown up, particularly the larger cabinet beetle, T. versicor and T. parabola, and in the survey, T. boron has shown to be exceedingly heavy in some areas. Perhaps someone from Kansas would like to report on the situation there. I recently had the opportunity to visit with Dr. Miller, chief Entomologist of Australia, and he said that without doubt it is the worst stored grain pest they have there. I'm sorry that Verne Thrailkil had to leave the conference because he just got back from a 2-year trip to India, Iran, Egypt and Pakistan on locust control. He said it was the worst stored grain pest in those countries. They take the attitude that they have to live with it. The khapra beetle takes 40% to 50% of the grain each year, so they try to produce enough each year to take care of this situation and get by with what is left. It was known first from Ceylon and Malaya and since has spread to all the middle east and far east, Japan and China to Germany and France and almost all intermediate points. The thing that has impressed me is its ability to build up and the damage it can do. I've seen almost all the infestations in California and I might cite one instance. I saw one infestation at Holtville, California, in January and they had a bin about 80 feet long and 40 feet wide made of cinder blocks and covered with a steel roof. In June a year ago they cleaned it out and sprayed it with lindane and a new crop of barley was stored in it. We saw it in January and larvae had started to work out of the grain, over the wall and dropped down outside. They were about 5 inches thick all around the sides, grading out to zero. Grain was steam rolled since this was about all they could do with it. The larvae feed more on broken kernels than on complete kernels. Damage seldom runs over 35%, although in instances it has run as high as 75%.

As far as I know, all state quarantines have been removed in favor of the federal quarantine but at one time there were 17 in effect. As far as we know all shipments out of the infested area into eastern states have been inspected and no infestations were found. To be sure to get sufficient strength of fumigant, 5 pounds of methyl bromide per 1,000 cu. ft. are used in California, used as a vapor. State Dept. of Agriculture has developed a trailer with neoprene tubing used to sample the gas concentration in the warehouse. Concentrations are recorded electrically. Well casings are sunk into bins so that the fumigant can be spread uniformly. A new quarantine on European chafer follows the pattern of the khapra beetle quarantine in that it will be on a premisis basis rather than on a political subdivision basis. Each female will lay about 50 eggs.

Question: What other things do khapra beetles feed on?

Davis: It's a tremendous list -- "Dead mice, fish meal, other meat products, all cereal products, and the larvae are capable of living up to three years without feeding", (quoted from Monthly Report of California State Dept. of Agriculture, Jan., Feb. and March issues). Davis then explains how the first infestation in California was thought to be the black carpet beetle and the warehouse tried to live with it. It was picked up by a Commodity Credit official. Without further checking they removed all the sacks over to a new warehouse, and since the beetle was in the sacks, a new infestation was started.

Mickle: We should be careful to distinguish between "used" and "reconditioned" bags.

Davis: Warehouses operate differently. All of the more reliable companies that process these bags do a dependable job, but you have the fringe areas to worry about where the bags aren't processed.

James (to Davis): Would you care to indicate how far north and east you think we need be concerned, in view of the fact that some damage has occurred in the British Isles?

Davis: It is a very serious pest in breweries and that is where they have the trouble in England. Beetles build up in malt warehouses, between the brick walls and wood liners. Dr. Cotton thought that it probably would not be a pest north of a line drawn east and west through Manhattan, Kansas. However, it has now been found in California 150 miles north of San Francisco which is roughly the same distance north of that line. We should watch out for the spread of this pest.

Knutson: I wish Prof. Wilbur were here instead of in Mexico. His work has been primarily on grain protectants, added at the time of combining. His activities during the past year have been in the further development of two commercial products, pyrethrins plus piperonyl butoxide, in a water soluble form in one case and in another case dissolved in a fumigant -- to be used in farm stored wheat.

Howell (to Knutson): What does he think of this type of protectant in the warmer areas?

Knutson: At Newton, Kansas, they were very successful.

Howell: In the south they weren't too successful with them. Is Kansas on the border line?

Knutson: Probably so. Although at Newton they were satisfactory.

Parks: Ohio is second in the use of U. S. Industrial Chemicals Pyrenone -- used powdered form. Two years ago the Farm Bureau, one of the chief distributors, disposed of 70 tons; last year 20 tons. Farmers are happy about it, but used less because of CCC fixed price scale being lower. We believe it is the logical and practical way to handle one season's storage. It can be used wrongly but this does not condemn the product. It is effective if used properly.

Knutson: Our studies were in open bins, old boxcars, etc., where fumigants could not be used.

Lou Davis: Insect Detection and Reporting. Perhaps we left a dark cloud hanging regarding khapra beetle. It is serious, but, according to inspections, it is on the downgrade.

I thought I might touch lightly on the history, a little briefly, since this was reported here in 1953 and 1954. Perhaps we have failed to put across, as far as the insect detection and advisory service is concerned, that that is just what it is -- a service. This came about at the request from industry and entomologists and at the E.S.A. meetings in 1951 -- a service to entomologists, formulators, manufacturers, and others; and, although not mentioned too much, as a means in combatting biological warfare. We have tried to set up our program as a service to agriculture, following the suggestions of the E.S.A. committee. We have a cooperative plan operating in 21 states, and 3 in the making. We pay 50% of the costs for the period that surveys are being made. Our program follows the pattern established in 1922 by Dr. Bishop, on survey methods. Where we have tried to improve this is to get the states to release this, currently, at the state level where and when it can be used. At the end of the year we ask for the 10 most important insects in the state for the year, and an estimate of loss estimates. Loss figures are needed for appropriations at state and federal level. We have conducted some special surveys, for example, help to E.S.A. on potato leafhopper, potato psyllid, sugar beet leafhopper, etc. We are interested in assembling information that will help with predictions. We have extensive light trap set-up from Florida to Great Lakes this year. We hope that state information will standardize survey methods, to get away from "heavy" or "light" reports, or reports from "one" apple tree. We are constantly uncovering survey methods on which we have no information. We hope the states will keep us informed. Some very good methods were developed by Forest Insects division before it was transferred to the Forest Service. We hope you will get these new methods to us so they can be published. We would like to use the same yardstick in every area.

Dave Mathew: Methods of Making Entomological Surveys. I'm the only survey entomologist here. July 1, 1953 the first survey was started in Missouri. George Thomas was the survey man, supported by Extension, State Dept. of Agriculture and Experiment Station. In Kansas I work for the State Ent. Commission and U.S.D.A. My office is at Kansas State College. There are two types of survey we have: (1) Current survey carried on throughout the state during the season, following the development of insects as they appear: First, army cutworms, pea aphids in alfalfa, greenbugs, other aphids, later armyworms and others. Also trouble shooting into areas needed. (2) Seasonal survey, annually, such as grasshopper adult and egg survey, chinchbug survey. Also special survey such as potato leaf hoppers, khapra beetles, etc. I might go over one survey: European corn borer survey -- 25 to 30 counties in northeastern Kansas. We plan 10 stops per county. We drive to an area previously spotted on the map (office), then pick the first cornfield adjacent this spot, walk into field 25 steps, take first stalk on right and examine the next 25 stalks in the row. Record number of stalks infested. Two stalks of the 25 are dissected, record number of larvae, and apply a factor for the field. Larvae are sent in for examination for parasites. Information is sent to Iverson at Minneapolis. We are after standardized methods of survey, and methods of reporting, and to locate specifically the infestations by portion of the state rather than by "some" valley. Report pests numerically rather than "heavy", or "light". Get information to Washington on Monday, so it can be included in current weekly report. We are trying to get accurate information on crop losses and insecticides used, cost, effectiveness. "Guesstimates" need to have some accurate basis. We depend on commercial people and Extension Entomologists, county agents to submit information to be included in report. Reports are mailed to the formulators, department heads, commission, county agents, and anyone else interested. Gates, the Extension Entomologist, gives current recommendations for control, in addition. I don't make recommendations. I'm strictly on survey. The program aids Extension, Research, taxonomists, detection of insects in biological warfare, if the time comes. We like the Missouri form on crop losses which carries the following information: date, location, number of infested acres, crop, part of crop (stem, leaves); percentage loss, any biological or chemical control in per cent, what used, and "remarks". A survey manual coming out will have standardized methods for several insects. What constitutes a heavy infestation, count per sweep, per plant? What about army cutworm -- worms per foot -- what about the spacing on the rows? How big a net? 180° sweep? 3/4 sweep? Now I'm ready to open this for discussion.

Burkhardt: Fork sample may be much better for sampling alfalfa, rather than sweeping. It makes a difference whether alfalfa is 2" tall or 12".

Mathews: This should be in the report -- alfalfa was 2" tall.

Dobson: Has anyone found yellow clover aphid in seedling alfalfa? No answer.

Howell: We are interested in temperature and wind on alfalfa insects. Wind change of 5 mph or a 10° change in temperature will change by 100 percent population picked up by sweeping. The same thing is very evident in brown wheat mite. In other words, don't you have to add temperature and wind to your report?

Dobson: We have to sweep before 11:00 a.m. and after 3:00 p.m. for lygus in cotton, during the heat of the day they are not in tops of plants -- too hot.

Hixon: Same thing is true in pea aphid in alfalfa.

Knutson: How much better is the fork sampler than pushing over part of the alfalfa and shaking off the samples and counting them later? Do we care whether there are 9,000 or 3,000, unless we are on academic study?

Howell: Fork sampler saves a lot of time -- don't have to count in field -- can count in laboratory up to 10 days later. Some of our workers were checking terminal and fork methods of sampling for yellow clover aphid, another worker was using the regular sweep method. The latter reported for a period of 5 weeks that the aphids were falling off. The men using the other methods reported increases, showing the difference in survey methods.

Knutson: And what was the explanation? Answer: Difference in location on plants.

Painter: We can summarize the use of the sweep net by saying it is a very valuable tool, if the other factors are taken into consideration, especially for getting information in a hurry on estimates.

Daniels: This argument about sweep nets and various absolute methods has been going on for years. I don't think you can standardize it because it varies with operator and conditions. It is a good tool but should be based upon 100 sweeps, but needs to be varied by the conditions present. I'm afraid that the work will be too tedious if we try to get absolute methods, but sound judgment is needed if sweep net is used.

Mickle: I'm concerned because in a state like Colorado, now we don't have a survey man, but if we did, he couldn't get over more than one-fourth of the state a week. We have to depend upon county agents, and others that have no technical training. Our discussions here have dealt with technical training. I don't like to by-pass our county agents. I'd like to get them all to use insect nets. It would help. How are we going to get a complete report of the state unless we do use our agents and others? I think we're going to get "bogged down" in some details here that are going to hinder the survey rather than help it.

Davis: I'd like to make just this observation. In our opinion we are not going to get all the answers without research. We'd like to encourage some projects devoted entirely to survey methods and losses. Research people are in accord and will try to institute this at an early date. Regarding Gordon's comment -- that has not been our purpose, and we know one man in a state cannot do a great deal as far as actual survey work is concerned. But, he has been able to set up voluntary cooperation between commercial people, sub-station, State and Federal people and to build an organization to bring the information into the clearing house. Gordon will admit, I'm sure, that you've got some county agents who are capable of reporting and will. Others are not capable and won't. But if they have an opportunity to work with someone and get the information together, there are a lot of county agents, horticultural inspectors, commercial people and others, who can be brought into the picture. These people can uncover infestations that were previously unknown. The survey should not be directed toward detection entirely.

Mathew: Del Gates and I are making collections to set up collection boxes for each county agent. Most agents are shy in entomological training. I've been kidded about this black insect net. I find that light colored insects show up much better in a black net.

Knight: I was wondering, in this sampling procedure, do you take a standard number of sweeps? Answer: Yes.

Knight There has been considerable work done on the sampling need to get accuracy. At the present, there is in the mill some work by Leo Iverson and R. L. Shotwell. They have developed a series of tables based upon the number of samples taken, through which you can determine whether or not you have taken enough samples. We hope that this will be cleared, revised and published.

Painter: There is considerable literature concerning the statistical aspects of the sweep method. I have pulled together some of the bibliography on that in case anyone is interested. I believe quite a lot of this is in my book on insect resistance in connection with methods.

Burkhardt: In connection with chinch bug surveys, we have a study underway on row spacing and the number of sorghum plants per acre. We made some observations this past season and there was a direct correlation between the square inch surface per plant and the damage done per plant. In other words, the more square inches per plant the greater the damage. Hence, the number of plants per acre would vary in fields and the damage would have to be measured differently.

D. W. Dean: The Residue Situation. The Pesticide Regulation Section, which I represent, has the regulatory act, the insecticide, fungicide, and rodenticide act. This act assumes a slightly greater significance with the enactment of the Miller Act. The Miller Pesticide amendment states that any raw agricultural commodity that bears or contains a pesticide is adulterated within the meaning of the Federal Food and Cosmetic Act unless there is an exemption for the pesticide or unless the amount is within a set tolerance. The act is quite technical, and provides a means for setting tolerances on raw agricultural products. It has some tie-in with the federal insecticide-fungicide-rodenticide act in that part of the words used in the act come from the insecticide act. Another tie-in with federal act concerns the products that are eligible for tolerances. Before a product can be considered eligible, it must be registered with the U. S. Dept. of Agriculture under the insecticide act. The additional items that have been placed under the U.S.D.A. are the certification of usefulness in agriculture of the material under consideration, also the pesticide regulation section, which has been detailed to this job, must consider whether the tolerance proposed is reasonable in light of the amount of material that must be used on a crop. We have been able to certify most of the products submitted. It has been quite a problem in the consideration of a proposed tolerance level to know whether it is reasonable. Manufacturing have had to gather residue information wherever they could get it. They didn't know that they would be confronted with the need for this data. Another place where we have run into difficulty with labels is on crops. There may be data for four out of six of the crops specified, but no data for the other two. Sometimes we are able to carry over from crop to crop. But usually this is very difficult due to variations in location and growing conditions of the crops. The law was to go into effect July 22, but for many crops there was an extension for certain of the chemicals.

Howell: Can you clarify the status of aramite?

Dean: The story is not complete on this chemical as yet. It looks now that none of formulations that leave residues will be acceptable.

Davis: Dean has given an excellent picture. I wonder if we all know that all of this information is published in the Federal Register, and one can subscribe to this.

Dean: You can also obtain this same information from Food and Drug Administration. Just write F.D.A. and ask them to place your name on their list.

Howell: Why did they suddenly say that aramite was extremely dangerous when up to that time it was considered safe? Will we have anything more than just this -- "Tolerance has been accepted."?

Dean: We will have to rely on the decision made by the advisory board. I doubt if the information on this will be available from any federal agency, only the company that made the tests.

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R. H. Painter: Some Entomological Notes From a Trip to Columbia. They don't have many roads in Columbia. Most travel is by air. This meeting that I attended was the third for agriculturists that has been sponsored jointly by the Rockefeller Foundation and the countries concerned, to encourage agricultural research in South American countries. They went into Mexico in 1943 to study corn which is the basic food crop of not only Mexico but also other Latin American Countries. By 1950, as a result of this program, partially at least, Mexico was exporting corn for the first time in 35 years. The first meeting was in Mexico, the second in Brazil, and the third was in Columbia. The fourth meeting will be in Chile. During the first part of the meetings, the sections met separately; that is, entomologists, pathologists, genetisists, soils men and so on. Then they met as groups on various crops -- corn, wheat, etc. The second week was devoted to Agricultural Experiment Stations. For the most part, meetings were round table discussions. There were 22 entomologists at the entomological meeting I attended, later joined by 3 more from Argentina. Ther were 8 entomologists from Columbia. They have to deal with not only temperate insect but also with tropical insects. In certain seasons you have continuous rain. Application of insecticides under those conditions are very difficult. They need particularly basic biology of insects. Very often they have to treat without knowing much about the biology. Insects go through their life history much quicker under tropical conditions. Populations increase more rapidly and situation is more acute. In corn, fall armyworm is rated No. 1 in practically every country. Much discussion on list of Spanish names for the insects. They have local Indian names for many of the pests, in addition to translations of English names for those pests, as well as Spanish names. A committee was set up to work on that problem and another committee set up to encourage publication of a catalog of Latin American insects. Discussion on where to get insects identified. They are trying to make up a list of entomologists who might be interested in identification of insects. Many of the younger entomologists and agricultural workers have been trained in the United States, some in their own countries and they are gradually replacing the older men who tend to treat agricultural problems on a theoretical basis, from book information coming from Europe or the United States that didn't have any application to their country at all. They have a higher regard for the American insecticides than they do for the European ones. This is probably due to the fact that American insecticides have information on the label as to the contents and how it may be used, whereas the contents in European insecticides is kept more or less secret. Many commercial men there are taking advantage of the fact that those countries do not have anything similar to our Food and Drug Act, so anything goes. They appreciate the attitude of the American people on that program.

Forest and Fruit Insects

Moderator -- Dr. Noel Wygant

T. H. Parks: "Insect Resistance to Some Insecticides". The coddling moth which is worrying Mr. Newton at the present time is deserving of consideration. The insect has developed resistance to DDT. In 1954 this was established in one orchard. Started using DDT in Ohio in 1945. The more generations an insect has, the quicker it will develop resistance to these organic insecticides. The growers have been urged to use DDT this year, at strategic times. They have interspersed the application with lead arsenic and with some of the phosphorous materials, especially parathion. Some have alternated DDT and parathion; a few have combined them. The outcome of both have been very satisfactory. Growing tendency is to get away from DDT. We consider a failure of insecticide where the point of injury reaches something like 15%. We have a more discriminating market than we used to have and the trade don't want blemished fruit. There is no resistance yet to coddling moth that we can measure chargeable to parathion. It has performed very well for us at the dosage of 1-1/2 pounds of parathion to 100 gallons of water, applied either as a concentrate or dilute high pressure application. We have a good crop of fruit. Of course, not as much as New York state or Virginia or Michigan. We expect about 4-1/2 million bushels of apples.

T. H. Parks: Red Mite (European). We think it's our major pest of fruit. Many generations in a year. Some growers are going back to the dormant oil. They still had to put on summer applications. Parathion was found to have fallen down miserably in control of red mite. We've tried EPN for one year without too much trouble, but now EPN has fallen down. We'll have to give up both of these now. What we'll do, I do not know, but we'll come up with something. We had to come out this year with emergency summer treatments other than the phosphates. Our growers have found Dow's Ovotran to be the most dependable. We hadn't used Ovotran very much previously, except in experimental ways. But something had to be done so we got to using it. It's done very well for one year. There are other materials that were used. One was Craig fungicide, known as demeton which also works against Red Mite. It's very expensive though. Aramite has been used as a summer miteicide. It has been fairly successful. Used widely as emergency treatment. With grapes we have not had any failure in controlling the insects with phosphorous materials. Parathion is used. We do not have a mite problem in grapes. DDT is used freely also. They do interchange the two materials in the vineyards.

Bill Wilford: Forest Insects (Engelmann Spruce Beetle). Most of our activities have been in southwestern Colorado since last year. We had another spruce beetle build-up in Engelmann spruce. It was a new outbreak developed because of a windstorm in June 1950. The area where the beetle did build up wasn't noticed until 1953. Detection was followed up with appraisal surveys. Control was immediately started in the fall of 1953 by Forest Service. That project is continuing this year. Outcome of control appears favorable. Control operation still underway. Infestation covers approximately 25,600 acres. All that area is surveyed and scouted. Last year's fall surveys reported 352,000 infested trees. As of July 31st there were 104,361 trees treated and 36,786 trees were logged. Control by logging is a major program. Chemical control program has been carried on in three large camps. Camps are manned by approximately 133 men per camp. 17,430 man days spent on control. Woodpeckers have been major factor in control program, on spruce beetles particularly. In this region much of timber is federally owned. All parts of land managed by one of the federal agencies. All foresters have had a course or two in forest entomology. We have been able to help the rangers directly or indirectly. Forest insect lab at Fort Collins is manned by from 1 to 7 technical entomologists. We are all responsible for some phase of surveys in addition to research work. Our survey work depends very much on the land managing agent. We contact the man in charge of the land we are visiting, usually a district ranger of the Forest Service. We invite him to accompany us on our survey. He often is the man who made the initial report to us where insects are involved. By on-the-ground training we are able to give these rangers and other personnel in Forest Service first-hand information with regard to forest insects. Regional office of the Forest Service has insisted that each forest designate one from the supervisor's office to be responsible for insect conditions on his range. He is responsible to the region in reporting insect conditions and to see that his rangers are reporting and to ask our participation in training schools and in other help we might give in regard to detection and determination of insects. These forms I brought were prepared by our office in conjunction with the regional office. Forms used throughout the United States are similar. The rancher or anyone involved will be able to report immediately any insect condition. He can report to us through the supervisor and through the regional forester. Once we receive these detection reports we follow them with appraisal surveys. The forest ranger does have to report once a year insect conditions on his forest. Often the ranger has seen conditions that bothered him a little but by the time he's supposed to report in August or September, he may have forgotten about it or all of a sudden remembers and reports them. Often those reports are too delayed to be of any value to us. He sends his report in to the supervisor, who in turn sends copies to the regional forester and directly to us. Each one of us in the laboratory gets a copy. Then it is up to us to make the appraisal survey and for us to determine how intensive our appraisal survey has to be. From this we make our reports and turn them in to the land managing agent such as the Forest Service, Park Service, private individuals, etc. It is not our decision as to whether or not control will be carried out. It is the decision of the land managing agent. They usually consult with us and we'll visit the areas involved. And in the case of the Forest Service, they'll send their request in to Washington. Final determination whether or not funds are available will come from Washington. Control is carried on by administrative branches of Forest Service. When control starts we act as consultants, technical advisors and provide them with information so that effective and sufficient control can be carried out. We have to depend on everyone throughout the country to report to us insect conditions as they might see them, whether they are hunting, fishing, picnicking or working in the woods. We are getting good response in our region. And I think throughout the country the Division of Forest Insect Research is getting the same kind of response. We are in the process of developing survey procedures. Surveys on forest insects have come up the hard way. It's by trial and error.

Question: This blowdown in trees was responsible for the bark beetle increase. And I take it that the beetle can attack healthy trees. Answer (Wygant): The reason for control effort was that these dying trees increased the density so that you had so many more bark beetles to attack healthy trees. They are ordinarily not in great numbers. I'm trying to draw the parallel between that and Scolytus multistriat in elms. The blowdown, I think, is comparable to our drought which has weakened a lot of trees. Elm bark beetle attacks drought-stricken trees much more readily. We have a comparable situation when the elm bark beetle is attacking healthy trees and weak ones either from natural gas poisoning or old age. The drouth builds up the bark beetle population and by the sheer numbers, more healthy trees are attacked the same as more healthy spruce are attacked.

Answer: (Wilford): That's right. The beetle will attack a healthy tree. We know a little about the biology of the spruce beetle. Spruce beetle is a native insect. They will attack green trees, old and mature trees. During last spring, in collecting of adults, Roy Nagel collected 9,000 spruce beetles from one tree that was down.

Remark: The woodpecker will take 95% or more in the standing trees. Woodpeckers don't feed very much on blown down trees and this permits a big buildup.

Wilford: The drouth changes the character of the trees, just as the blowdown.

Fred Knight: Parasite studies -- Engelmann Spruce Beetle. We want to get something on the biology of spruce beetle during its endemic stages. Our work in biology this year concerned mainly the parasites. Primarily with Coeloides dendroctoni which attacks the individual larvae through the bark. The female parasite lays eggs through the bark, and attaches the eggs to the larvae of the spruce beetle and at the same time she paralyzes it. We are trying to learn the life cycle of this parasite this summer. We suspect it's a one-year cycle and the parasite must go through a cold period during the winter. On the mountain pine beetle they found out that 95% of them had a one-year cycle. We are collecting cocoons, subjecting them to cold temperatures. Next winter we'll be attempting some mass rearing procedures. We've tried other insects for mass rearing, such as pea weevil, or bean weevil, but it seems doubtful now because the female parasite seems to enjoy laying her eggs through the bark and it may be difficult to get her to lay it through the bean. We've been checking trap trees each year to see just how effective the trap trees are in extreme epidemics and in areas where we have more endemic situation. At present we find that trap trees are excellent means of control, especially where beetles are on the downtrend. We have found that a person shouldn't go in and cut trees helter skelter. In any area, more than 50 trap trees is waste. The effectiveness of the trap trees seems to be much greater in the endemic areas. We're going to follow these trap-tree areas a number of years to get some answers on the number of trap trees needed for various areas.

Fred Knight: Bark Beetle Survey Studies. In spruce we settled on a survey method where we cruise all the timber in the infested area using parallel strip lines and using 1/10 acre plots. In 100 to 500 acres we use about a 10% cruise; 500 to 5,000 acres we run about 2-1/2% cruise. The 1/10 acre plots work best. Spruce trees are often attacked on one side by the beetle and on strip cruise the cruiser usually tries to see the trees from where he's walking in the center of the line. You can't do that with spruce. They have limbs that reach the bottom. He has to stop and cruise all around it and look at all the trees. We use the airplane somewhat in spruce, primarily as a reconnaissance device. In Ponderosa pine we have done a more extensive survey and have settled on a 1/2 chain strip cruise. In pine we have a grouped effect with no particular pattern. There may be a spot of 25 or 30 trees attacked. Then you may travel 1/2 mile and find another spot with 2 or 3 trees. Our aerial method in pine is very promising. We can get a very good cruise in pine by the faded trees. When the pine is faded in color, the beetles have probably already left the tree. Those beetles that have left the tree will attack another tree in that vicinity. We can get very accurate counts of the red-top trees from the air, using color photography. We're trying to develop a method for getting an accurate ratio on the ground. So again we are using the ground survey method and use the airplane for reconnaissance. We have the Douglas fir beetle on which we have not developed a method of survey and we have the Great Basin tent caterpillar for which we have not adopted a system for survey.

Ted Thatcher: We had an outbreak of beetles in pinon pines in Fremont County, Pinus edulis, or two-needled pinon. On April 29th I found an area, 27 x 27 x 10 miles, infested with Ips leconti. In Salt Canyon area near Penrose it appeared that in excess of 80% of the pines had been killed. Drouth had weakened the trees. The Ips is not a primary attacker on trees. It was secondary normally. But it was attacking early enough that on the drouth-weakened trees that it was causing pitch tubes. We found that they had succumbed to the drouth. They had overwintered in galleries in the trees. In the samples I took it was indicated that approximately 90% of the beetles had died from the dryness overwinter. I predicted from this that there would not be an epidemic anymore. Of course there weren't any trees left. They had an extremely low rainfall in this area for two years. On July 9th I again examined the trees and found very little evidence of any new attacks in this area. The trees were not being attacked by Ips but by Pityophthoris which was killing out the twigs. One tree in particular I checked completely and it seemed that 100% of the twigs were infested. These trees were in rocky, dry locations. Samples brought back to the laboratory at this time showed that the spring brood, that had made the attack, were pupating by July 17th. There were no new attacks in this area but some new attacks occurred north of the old epidemic area -- but not as vigorous and seemed to be dying out.

Wygant: Forest Service is making every effort to harvest and manage the virgin stands of Engelmann Spruce. A study is underway by the Rocky Mountain Station at Frazier, using a harvest method developed and patented by a Swiss name Weisand. He recently installed one of the systems at Frazier. The reason for testing this system is to try to alleviate the spruce beetle problem and to try to harvest on the slope without disturbing the soil.

Last year we reported over one million acres of a spruce budworm infestation in northern New Mexico and parts of Arizona. This past season over 400,000 acres were sprayed by Forest Service using one pound of DDT in one gallon of water per acre. Results satisfactory. We hope no control will be necessary next year. The Great Basin tent caterpillar is in epidemic proportions in northern New Mexico and southern Colorado and has been in northern New Mexico for five years. The low value of the aspen trees prevents the expenditure of any large amount of money for control. Dr. Massey made a small scale test with a virus imported from California at the same time a native virus showed up in northern New Mexico, so we are hopeful that we will get some alleviation from this in 1956.

Joe Pankaski: Insecticides. The biggest problem at the moment is with the Miller Bill. It behooves all of us to try to make it work. I'd like to put in a plug for Shell's new phosphate systemic. Actually, it is not new since it has been out a year now. It is a short-lived systemic -- 3 to 5 days. Shows promise on aphids, mites, several lepidoptera and certain other pests. The short-lived nature would indicate use where there are problems in control near harvest. This is important in view of the Miller Bill.

(Extended discussion follows on residues -- not definite enough to include in report -- opinions).

Pankaski: We've been thorough in our residue analyses studies but I believe we will have to be more thorough. Asks of Exp. Sta. -- Is this our problem or the responsibility of Experiment Station? No answer.

Priola: Endrin on corn leaf aphid looks very good. It was brought out this is a serious problem in many areas almost every year.

Marvin: We had a big outbreak of chinch bug, also corn leaf aphid in sorghum. A lot of sorghum was treated. Are we going to have a chance to have someone follow these applications to see if the results are good or if any damage is occurring? We need a man at the Station to follow up some of these things -- a floating entomologist to hit the high spots during the year.

Parks: Parathion was used by commercial operators on corn leaf aphid on corn. It was not our recommendation. The application was a complete failure. We have an aerial operator's school in cooperation with Indiana. I believe we have their confidence. I've been called on treating wheat for English grain aphid by aerial applicators. I discouraged this since I don't believe the aphid causes much damage.

Howell: Stated in the discussion of new materials, "We won't test anything unless we know what is in the product. This is a policy of our director."

Question to Knutson: I would like to know from toxaphene people what they are recommending as the waiting period when the temperature is 80° and 100° (1-1/2#).

Answer: Standard is forty days.

Knutson: It seems that, with our hot days, the waiting period could be shortened. Missouri has brought up the same question.

Ray: Certainly, it is obvious that residues are tied up with vapor pressure. It would be different in Arizona than in other areas for instance.

There was extended discussion on miscellaneous subjects relating to new insecticides, residues, etc. As much of this was from the floor and in some cases not clearly recorded, it does not seem advisable to attempt to report it.

Social and Recreational Activities

Over the years of the meetings of the Rocky Mountain Conference of Entomologists the social and recreational activities have proven to be very important features. Old friendships are renewed and new ones made. Members of the families become a part of the gathering and are just as anxious to return as are the entomologists. The evening meetings which were reserved for subjects of least technical nature, pictures, general entertainment, group singing, square dancing, etc., were entered into by all. The teenagers and kiddies have made their evening of entertainment a tradition. This year several came prepared. A roaring bonfire and an outdoor lunch preceded the entertainment of the last evening. The group singing about the fire was centered about a very talented, teen-aged accordianist. The crafts workshop directed by the craftsmen for the 4-H Clubs keeps many of the ladies pleasantly occupied. The day voted for recreation was a beautiful one, with everyone taking their lunch and doing as they pleased. A 10:00 fish fry that night speaks for itself. There were more than the usual number of insect collectors in the group, with the result that no doubt several new species were taken out of this interesting high altitude area. Miniature golf and horseshoes were again popular. More than thirty two-man teams, with partners determined by lot were entered in the men's contest. The finals were won, before a noisy group of spectators, by T. R. Robb and Bob Simpson, with the team of "Lefty" Hixson and Les DePew being the runners-up.

Report of Business Meetings

A short business meeting was held the evening of the first day and another during the afternoon of the last day.

The following committees were appointed by Chairman Phil Ray:

Program: Ephriam Hixson, Chairman; T. H. Parks, D. E. Howell, Herbert Knutson and George M. List

Entertainment: Mrs. Cliff Walstrom, Chairman; Mrs. Maurice James, Mrs. Clarence Sooter, Mrs. William Foeppel, and T. O. Thatcher. T. R. Robb, general manager of the horseshoe contest.

Work Detail: Cliff Walstrom, Chairman; Mrs. L. B. Daniels and Ray Fuxa.

Nominating Committee: Dr. Parks, Chairman, T. R. Robb, and Clarence Sooter.

The nominating committee, at the afternoon business meeting, offered the following names for officers for 1956:

Chairman: Clarence A. Sooter

Vice Chairman: Chris Burkhardt

Secretary: George M. List

Assistant Secretary: Gordon Mickle

Treasurer: John L. Hoerner

Assistant Treasurer: T. O. Thatcher

All were unanimously elected.

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